

APPENDIX III. AQUATIC EECs – PRZM-EXAMS (Documentation) and GENEEC Model (Examples)

CHLORPYRIFOS

PRZM-EXAMS EEC Summary Sheet

Crop	Rate (lbs/ac)	No. Appls.	Interval (days)	Peak (ppb)	96 Hours (ppb)	21 Day (ppb)	60 Day (ppb)	90 Day (ppb)
Corn IA	3.0	1	N/A	2.75	2.18	1.28	0.81	0.63
Corn Foliar (FL-GA)	1.0	11	3	33.8	28.1	23.7	16.3	13.0
Corn IA (typical rate)	1.1	1	N/A	0.98	0.77	0.44	0.22	0.18
Corn MS (typical rate)	1.1	1	N/A	2.71	2.22	1.26	0.69	0.55
Peanuts GA	2.0	2	40	9.38	7.36	4.29	2.58	2.16
Cotton MS	1.0	6	3	27.2	22.9	17.3	9.71	7.55
Tobacco NC	5.0	1	N/A	30.6	24.0	12.0	6.85	5.26
Citrus FL	3.5	2	30	37.3	30.9	18.8	12.9	10.6

## **SCENARIO SUMMARY FOR CORN**

This report describes the Tier II estimated environmental concentration (EEC) computer modeling for chlorpyrifos use on corn. The purpose of this analysis is to generate an aquatic exposure estimates for use in a refined ecological risk assessment for this chemical. This Tier II EEC calculation uses a single Iowa site which represents a high yet typical exposure scenario for the use of chlorpyrifos. The more extreme sites in southern states are believed to be well above the 90<sup>th</sup> percentile in terms of severity. In furrow applications with two-inch incorporation is simulated. The weather and agricultural practice are simulated at the site over 36 years so that the ten-year exceedence probability EEC at that site can be estimated.

The EEC's generated in this analysis were calculated using PRZM3.12 for simulating runoff from the agricultural field and EXAMS2.97.5 for estimating environmental fate and transport in surface water. Input values for both programs are attached to this report in Tables 1 and 2. The scenario chosen was a corn field in Pottawattamie County, Iowa. The modelling predicts an annual total of 4.5 inches of runoff or approximately 12 percent of rainfall. This Marshall silty clay loam soil is a B hydrologic group soil which would be expected to produce moderate runoff and erosion. Sites exist which would represent a worse case for corn (i.e., Mississippi) which would lead to higher EEC values (possibly by a factor of 2 to 3). Due to the great prevalence of corn in the Mid-West, however, these sites would be outside the 90% worst case sites we normally model and so are not considered here. A copy of the PRZM3.12 input file is attached.

The EXAMS2.97.5 receiving water program was used to simulate the fate and transport of chlorpyrifos in the standard static pond. Calculations were made for one application on May 14 each year as is typical practice in this area. The Tier 2 one in ten year EEC's are graphed and listed below. The EEC's have been calculated so that in any given year, there is a 10% probability that the maximum of the average concentrations for each duration in that year will equal or exceed the EEC at the site.

### **Scenarios**

The scenario chosen was used to represent a typical to high runoff site for chlorpyrifos applied on corn. The site represents a 10-hectare corn field draining into a 1-hectare static pond, 2-meters deep with no outlet. It is assumed that evaporation losses and inflow from rainfall and runoff are in balance.

The site is a field in MLRA 107. Data for the Marshall Silty Clay Loam was taken from the PIC database and the 1987 National Resources Inventory. This is hydrologic group B soil and SCS curve numbers were generated based on this grouping. USLE soil loss ratios are based on plant cover and USDA Paper 537 (United States Soil Conservation Service, 1972). Weather data was taken from weather station W14943 in Sioux City, IA. The weather data file is part of the PIRANHA shell and is used to represent the weather for all of MLRA 107. This site receives about 87 centimeters of precipitation yearly and an average of 12% of this leaving the field as

runoff.

## **Environmental Fate Inputs**

Environmental fate inputs to the PRZM and EXAMS programs are listed along with their sources in Tables 1 and 2 attached. All chemical specific inputs are derived from environmental fate studies submitted by the registrant and accepted by EPA.

## **Results**

Modeling results are shown on the attached graphs and spreadsheet tables and are include in the EEC Modeling Summary sheet below.

## **Limitations of this Analysis**

There are several factors which limit the accuracy and precision of this analysis including the selection of the high exposure scenarios, the quality of the input data, the ability of the models to represent the real world, and the number of years that were modeled.

Scenarios that are selected for use in Tier 2 EEC calculations are ones that likely to produce large concentrations in the aquatic environment. Each scenario should represent a real site to which the pesticide in question is likely to be applied. Sites should be extreme enough to provide conservative estimates of the EEC, but not so extreme that the model cannot properly simulate the fate and transport processes at the site. Currently, sites are chosen by best professional judgement to represent sites which generally produce EEC's larger than 90% of all sites use for that crop. In this modeling, a more typical site was run because the higher exposure sites (i.e., Mississippi) are beyond the ninetieth percentile due to the predominance of corn in the midwest. The EEC's in this analysis are accurate only to the extent that the site represents this hypothetical site. Another limiting part of the site selection is the use of the standard pond with no outlet. Obviously, a Georgia pond, even with appropriately modified temperature data is not the most appropriate water body for use in Iowa. It does however provide a level playing field on which most pesticides can be judged on equal terms.

The models themselves represent a limitation on the analysis quality. While the models are some of the best environmental fate estimation tools available, they have significant limitations in their ability to represent some processes. The most substantial limitation in this analysis is the handling of spray drift, which is estimated as a straight 5% of the application rate reaching the pond for each application. A second major limitation of the models is the lack of validation at the field level for pesticide runoff. While several of the algorithms (volume of runoff water, eroded sediment mass, are well validated and well understood, no adequate validation has yet been made of PRZM3.12 for the amount of pesticide transported in runoff events for all combinations of sites and pesticide fate characteristics. Other limitations of the models include: inability to handle within site variation (spatial variability), lack of crop growth algorithms, and overly simple soil

water transport algorithms (i.e., the "tipping bucket" method).

A final limitation is that only thirty-six years of weather data was available for the site. Consequently there is approximately 1 chance in 20 that the true 10% exceedence EEC's are larger than the maximum EEC in the calculated in the analysis.

Three other corn scenarios were modeled with PRZM3.12-EXAMS: 11 foliar applications at 1.0 lb ai/A in Florida and Georgia; and the typical use rate, 1.1 lb ai/A in Iowa and Mississippi. The general assumptions, procedures, and limitations cited in the above scenario on corn in Iowa would apply to the following three scenarios.

The corn scenario was modeled for 11 foliar applications on sweet corn for Florida and Georgia registration. The site is a sweet corn field in Crisp County, GA. The eleven aerial spray applications at 1.0 lb ai/A are assumed to be applied at 3-day intervals between treatments. Spray drift was assumed to be 5 percent of the amount applied to the 10-hectare corn field. The soil type is Cowarts sandy loam. Soil parameters were taken from the PIC database and the 1987 National Resources Inventory. The Cowarts sandy loam is hydrologic group C soil and SCS curve numbers were generated based on this grouping and the plant cover (United States Soil Conservation Service, 1972). The weather data file is part of the PIRANHA shell and is used to represent the weather for MLRA 133A in the Southern Coastal Plain. Runoff from the sweet corn field is into a 1-hectare Georgia pond which is described above.

The typical use for Iowa corn is a pre-plant, ground broadcast application of granules (Lorsban 15G) at 1.1 lbs ai/A with soil incorporation to a depth of 4 inches. The Iowa corn field modeled in this scenario is also located in Pottawattamie County, Iowa and employed the same soil type and weather station.

The typical use for Mississippi was a pre-plant, ground broadcast application of granular Lorsban 15G at 1.1 lbs ai/A with soil incorporation to a depth of 4 inches. The site is a corn field in Jackson, Mississippi. The soil type used in the model is Loring silt loam. Soil parameters were taken from the PIC database and the 1987 National Resources Inventory. The Loring silt loam is hydrologic group C soil and SCS curve numbers were generated based on this grouping and the plant cover (United States Soil Conservation Service, 1972). The weather data file is part of the PIRANHA shell and is used to represent the weather for MLRA 134 from Southern Mississippi Valley silty uplands.

Chlorpyrifos (JCL) January 31, 2000

Marshall Silty Clay Loam MLRA M-107, Pottawattamie County, IA

0.710	0.500	0	15.80	1	1		
4							
0.320	3.060	0.500	10.00	3	4.00	354.0	
1							
1	0.25	90.00	100.00	3	86	78	82
1	3						

0101 2105 1210

0.50 0.25 0.30

0.04 0.04 0.04

36

210548	260948	111048	1
210549	260949	111049	1
210550	260950	111050	1
210551	260951	111051	1
210552	260952	111052	1
210553	260953	111053	1
210554	260954	111054	1
210555	260955	111055	1
210556	260956	111056	1
210557	260957	111057	1
210558	260958	111058	1
210559	260959	111059	1
210560	260960	111060	1
210561	260961	111061	1
210562	260962	111062	1
210563	260963	111063	1
210564	260964	111064	1
210565	260965	111065	1
210566	260966	111066	1
210567	260967	111067	1
210568	260968	111068	1
210569	260969	111069	1
210570	260970	111070	1
210571	260971	111071	1
210572	260972	111072	1
210573	260973	111073	1
210574	260974	111074	1
210575	260975	111075	1
210576	260976	111076	1
210577	260977	111077	1
210578	260978	111078	1
210579	260979	111079	1
210580	260980	111080	1

210581 260981 111081 1  
210582 260982 111082 1  
210583 260983 111083 1

Application: 1 app. of 3.36 lbs A.I./acre, ground spray 95% eff. w/1.4%drift.

36 1 0

Chlorpyrifos: ASM: t<sub>1/2</sub> = 76.9 days, koc = 6070

140548 0 1 5.08 3.36 0.95 0.01  
140549 0 1 5.08 3.36 0.95 0.01  
140550 0 1 5.08 3.36 0.95 0.01  
140551 0 1 5.08 3.36 0.95 0.01  
140552 0 1 5.08 3.36 0.95 0.01  
140553 0 1 5.08 3.36 0.95 0.01  
140554 0 1 5.08 3.36 0.95 0.01  
140555 0 1 5.08 3.36 0.95 0.01  
140556 0 1 5.08 3.36 0.95 0.01  
140557 0 1 5.08 3.36 0.95 0.01  
140558 0 1 5.08 3.36 0.95 0.01  
140559 0 1 5.08 3.36 0.95 0.01  
140560 0 1 5.08 3.36 0.95 0.01  
140561 0 1 5.08 3.36 0.95 0.01  
140562 0 1 5.08 3.36 0.95 0.01  
140563 0 1 5.08 3.36 0.95 0.01  
140564 0 1 5.08 3.36 0.95 0.01  
140565 0 1 5.08 3.36 0.95 0.01  
140566 0 1 5.08 3.36 0.95 0.01  
140567 0 1 5.08 3.36 0.95 0.01  
140568 0 1 5.08 3.36 0.95 0.01  
140569 0 1 5.08 3.36 0.95 0.01  
140570 0 1 5.08 3.36 0.95 0.01  
140571 0 1 5.08 3.36 0.95 0.01  
140572 0 1 5.08 3.36 0.95 0.01  
140573 0 1 5.08 3.36 0.95 0.01  
140574 0 1 5.08 3.36 0.95 0.01  
140575 0 1 5.08 3.36 0.95 0.01  
140576 0 1 5.08 3.36 0.95 0.01  
140577 0 1 5.08 3.36 0.95 0.01  
140578 0 1 5.08 3.36 0.95 0.01  
140579 0 1 5.08 3.36 0.95 0.01  
140580 0 1 5.08 3.36 0.95 0.01  
140581 0 1 5.08 3.36 0.95 0.01  
140582 0 1 5.08 3.36 0.95 0.01  
140583 0 1 5.08 3.36 0.95 0.01

0 1 0.00

Marshall Silt Clay Loam, Group C;

150.00 0.0 0 0 0 0 0 0 0 0

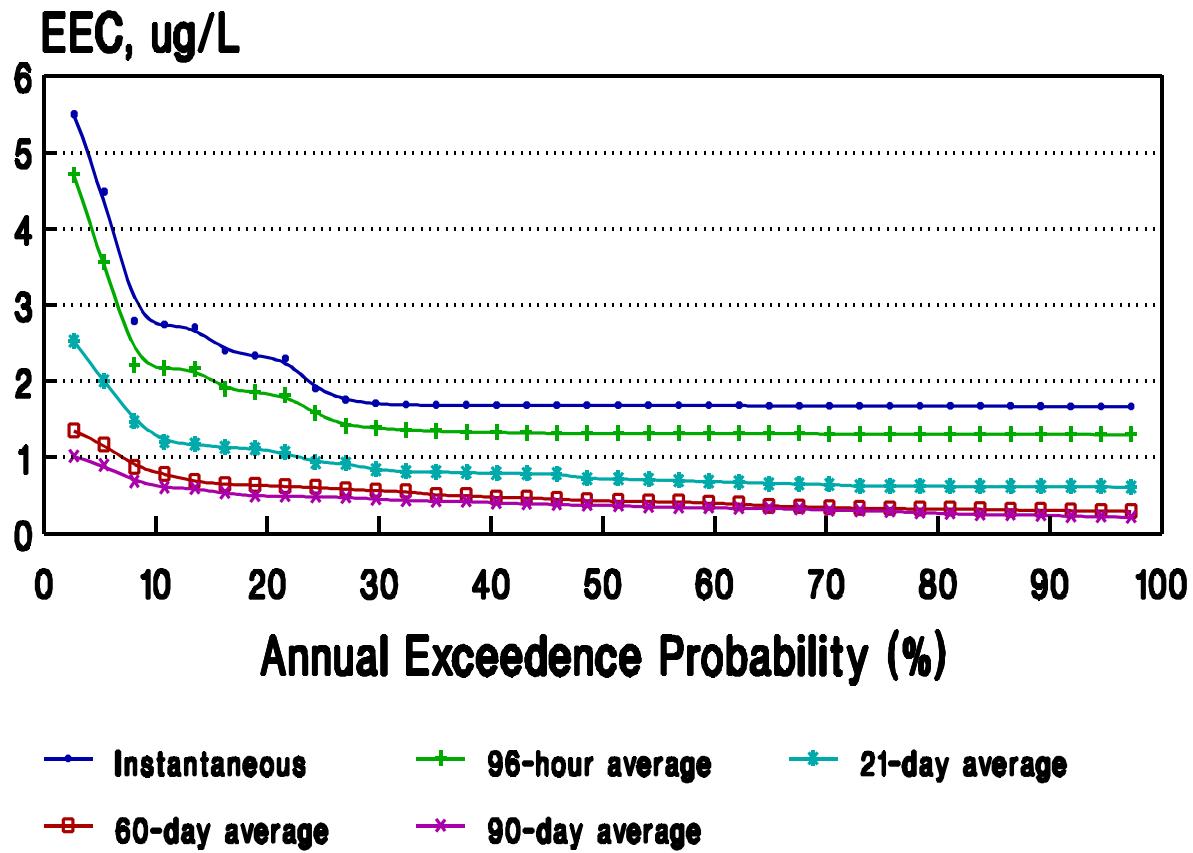
4300.0 0.0012 0.00  
4  
1 10.00 1.250 0.495 0.000 0.000  
9.01E-3 9.01E-3 0.000  
0.1 0.495 0.265 1.740 105.6  
2 35.00 1.250 0.495 0.000 0.000  
9.01E-3 9.01E-3 0.000  
1.0 0.495 0.265 1.740 105.6  
3 100.00 1.300 0.416 0.000 0.000  
0.0109 0.0109 0.000  
5.0 0.416 0.216 0.116 7.04  
4 5.00 1.300 0.416 0.000 0.000  
0.0109 0.0109 0.000  
5.0 0.416 0.196 0.058 3.52  
0 0  
WATR YEAR 10 PEST YEAR 10 CONC YEAR 10 1  
6  
11 -----  
5 DAY  
RFLX TSER 0 0 1.E5  
EFLX TSER 0 0 1.E5  
ESLS TSER 0 0 1.E0  
RUNF TSER 0 0 1.E0  
PRCP TSER 0 0 1.E0

Chlorpyrifos use on corn - Pottawattamie County, Iowa  
 Major Land Resource Area 107: Iowa and Missouri Deep Loess Hills  
 Marshall Silty Clay Loam (Hydraulic Soil Group: C)  
 1 ground application at 3.0 lb a.i./ac

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
---	---	-----	-----	-----	-----	-----
1948	1.664	1.299	.613	.327	.304	.138
1949	1.675	1.329	.680	.472	.373	.157
1950	1.682	1.315	.682	.455	.393	.173
1951	4.476	3.549	2.002	1.164	.893	.316
1952	2.737	2.166	1.201	.646	.493	.180
1953	1.670	1.305	.657	.335	.252	.088
1954	1.672	1.307	.619	.301	.223	.089
1955	1.672	1.306	.619	.395	.328	.119
1956	1.668	1.303	.616	.344	.349	.132
1957	1.686	1.317	.709	.436	.330	.144
1958	1.671	1.306	.619	.310	.335	.140
1959	1.703	1.332	.792	.473	.437	.190
1960	1.679	1.415	.933	.609	.483	.187
1961	2.782	2.202	1.467	.873	.683	.265
1962	2.291	1.813	1.062	.638	.594	.217
1963	1.679	1.312	.624	.361	.274	.098
1964	2.329	1.852	1.171	.782	.606	.203
1965	2.699	2.158	1.117	.582	.491	.264
1966	1.679	1.320	.813	.503	.428	.159
1967	1.670	1.304	.723	.566	.456	.164
1968	1.897	1.577	.810	.502	.387	.171
1969	1.679	1.359	.839	.422	.372	.160
1970	1.671	1.306	.622	.320	.268	.115
1971	2.395	1.896	1.128	.622	.478	.162
1972	1.682	1.314	.624	.325	.304	.135
1973	1.684	1.317	.696	.422	.343	.162
1974	1.675	1.309	.622	.294	.217	.087
1975	1.673	1.307	.646	.331	.246	.083
1976	1.667	1.302	.803	.399	.297	.091
1977	1.683	1.315	.720	.358	.345	.165
1978	1.680	1.313	.790	.430	.405	.160
1979	1.679	1.313	.624	.300	.230	.086
1980	1.667	1.347	.925	.684	.534	.197
1981	1.679	1.312	.654	.309	.248	.096
1982	5.492	4.699	2.521	1.353	1.015	.337
1983	1.750	1.387	.787	.557	.428	.145
upper						
10th	2.750	2.177	1.281	.809	.629	.264
percentile						

MEAN OF ANNUAL VALUES = .160  
 STANDARD DEVIATION OF ANNUAL VALUES = .062  
 UPPER 90% CONFIDENCE LIMIT ON MEAN = .176

**EEC Plot - Chlorprifos Use on Corn  
Major Land Resource Area (MLRA): 107  
Iowa and Missouri Deep Loess Hills**



**Marshall Silty Clay Loam (HSG: C)  
1 Ground Application @ 3.0 lb a.i./ac**

PRZM3 Input File, gascorn.inp (Feb 1, 2000), Chlorpyrifos  
Cowarts sandy loam; MLRA P-133A, Crisp County, Georgia

0.750 0.150 0 17.00 1 3

4

0.24 0.33 0.50 10.00 3 1.00 354.0

1

1 0.25 90.00 100.00

3 91 85 88 0.00 100.00

1 3

0101 21 9 2209

0.50 0.25 0.30

.023 .023 .023

36

110448 280848 120948 1

110449 280849 120949 1

110450 280850 120950 1

110451 280851 120951 1

110452 280852 120952 1

110453 280853 120953 1

110454 280854 120954 1

110455 280855 120955 1

110456 280856 120956 1

110457 280857 120957 1

110458 280858 120958 1

110459 280859 120959 1

110460 280860 120960 1

110461 280861 120961 1

110462 280862 120962 1

110463 280863 120963 1

110464 280864 120964 1

110465 280865 120965 1

110466 280866 120966 1

110467 280867 120967 1

110468 280868 120968 1

110469 280869 120969 1

110470 280870 120970 1

110471 280871 120971 1

110472 280872 120972 1

110473 280873 120973 1

110474 280874 120974 1

110475 280875 120975 1

110476 280876 120976 1

110477 280877 120977 1

110478 280878 120978 1

110479 280879 120979 1

110480 280880 120980 1

110481	280881	120981	1
110482	280882	120982	1
110483	280883	120983	1

Application: 11 aerial spray apps of 1.0 lb a.i/a, 95% app eff, 15% spray drift

396 1 0

Chlorpyrifos Koc:6070 AeSM: T1/2=76.93 (62.09) days

040848	0 2 0.00	1.12 0.95 0.15
070848	0 2 0.00	1.12 0.95 0.15
100848	0 2 0.00	1.12 0.95 0.15
130848	0 2 0.00	1.12 0.95 0.15
160848	0 2 0.00	1.12 0.95 0.15
190848	0 2 0.00	1.12 0.95 0.15
220848	0 2 0.00	1.12 0.95 0.15
250848	0 2 0.00	1.12 0.95 0.15
280848	0 2 0.00	1.12 0.95 0.15
310848	0 2 0.00	1.12 0.95 0.15
030948	0 2 0.00	1.12 0.95 0.15
040849	0 2 0.00	1.12 0.95 0.15
070849	0 2 0.00	1.12 0.95 0.15
100849	0 2 0.00	1.12 0.95 0.15
130849	0 2 0.00	1.12 0.95 0.15
160849	0 2 0.00	1.12 0.95 0.15
190849	0 2 0.00	1.12 0.95 0.15
220849	0 2 0.00	1.12 0.95 0.15
250849	0 2 0.00	1.12 0.95 0.15
280849	0 2 0.00	1.12 0.95 0.15
310849	0 2 0.00	1.12 0.95 0.15
030949	0 2 0.00	1.12 0.95 0.15
040850	0 2 0.00	1.12 0.95 0.15
070850	0 2 0.00	1.12 0.95 0.15
100850	0 2 0.00	1.12 0.95 0.15
130850	0 2 0.00	1.12 0.95 0.15
160850	0 2 0.00	1.12 0.95 0.15
190850	0 2 0.00	1.12 0.95 0.15
220850	0 2 0.00	1.12 0.95 0.15
250850	0 2 0.00	1.12 0.95 0.15
280850	0 2 0.00	1.12 0.95 0.15
310850	0 2 0.00	1.12 0.95 0.15
030950	0 2 0.00	1.12 0.95 0.15
040851	0 2 0.00	1.12 0.95 0.15
070851	0 2 0.00	1.12 0.95 0.15
100851	0 2 0.00	1.12 0.95 0.15
130851	0 2 0.00	1.12 0.95 0.15
160851	0 2 0.00	1.12 0.95 0.15
190851	0 2 0.00	1.12 0.95 0.15

220851 0 2 0.00 1.12 0.95 0.15  
250851 0 2 0.00 1.12 0.95 0.15  
280851 0 2 0.00 1.12 0.95 0.15  
310851 0 2 0.00 1.12 0.95 0.15  
030951 0 2 0.00 1.12 0.95 0.15  
040852 0 2 0.00 1.12 0.95 0.15  
070852 0 2 0.00 1.12 0.95 0.15  
100852 0 2 0.00 1.12 0.95 0.15  
130852 0 2 0.00 1.12 0.95 0.15  
160852 0 2 0.00 1.12 0.95 0.15  
190852 0 2 0.00 1.12 0.95 0.15  
220852 0 2 0.00 1.12 0.95 0.15  
250852 0 2 0.00 1.12 0.95 0.15  
280852 0 2 0.00 1.12 0.95 0.15  
310852 0 2 0.00 1.12 0.95 0.15  
030952 0 2 0.00 1.12 0.95 0.15  
040853 0 2 0.00 1.12 0.95 0.15  
070853 0 2 0.00 1.12 0.95 0.15  
100853 0 2 0.00 1.12 0.95 0.15  
130853 0 2 0.00 1.12 0.95 0.15  
160853 0 2 0.00 1.12 0.95 0.15  
190853 0 2 0.00 1.12 0.95 0.15  
220853 0 2 0.00 1.12 0.95 0.15  
250853 0 2 0.00 1.12 0.95 0.15  
280853 0 2 0.00 1.12 0.95 0.15  
310853 0 2 0.00 1.12 0.95 0.15  
030953 0 2 0.00 1.12 0.95 0.15  
040854 0 2 0.00 1.12 0.95 0.15  
070854 0 2 0.00 1.12 0.95 0.15  
100854 0 2 0.00 1.12 0.95 0.15  
130854 0 2 0.00 1.12 0.95 0.15  
160854 0 2 0.00 1.12 0.95 0.15  
190854 0 2 0.00 1.12 0.95 0.15  
220854 0 2 0.00 1.12 0.95 0.15  
250854 0 2 0.00 1.12 0.95 0.15  
280854 0 2 0.00 1.12 0.95 0.15  
310854 0 2 0.00 1.12 0.95 0.15  
030954 0 2 0.00 1.12 0.95 0.15  
040855 0 2 0.00 1.12 0.95 0.15  
070855 0 2 0.00 1.12 0.95 0.15  
100855 0 2 0.00 1.12 0.95 0.15  
130855 0 2 0.00 1.12 0.95 0.15  
160855 0 2 0.00 1.12 0.95 0.15  
190855 0 2 0.00 1.12 0.95 0.15  
220855 0 2 0.00 1.12 0.95 0.15

250855 0 2 0.00 1.12 0.95 0.15  
280855 0 2 0.00 1.12 0.95 0.15  
310855 0 2 0.00 1.12 0.95 0.15  
030955 0 2 0.00 1.12 0.95 0.15  
040856 0 2 0.00 1.12 0.95 0.15  
070856 0 2 0.00 1.12 0.95 0.15  
100856 0 2 0.00 1.12 0.95 0.15  
130856 0 2 0.00 1.12 0.95 0.15  
160856 0 2 0.00 1.12 0.95 0.15  
190856 0 2 0.00 1.12 0.95 0.15  
220856 0 2 0.00 1.12 0.95 0.15  
250856 0 2 0.00 1.12 0.95 0.15  
280856 0 2 0.00 1.12 0.95 0.15  
310856 0 2 0.00 1.12 0.95 0.15  
030956 0 2 0.00 1.12 0.95 0.15  
040857 0 2 0.00 1.12 0.95 0.15  
070857 0 2 0.00 1.12 0.95 0.15  
100857 0 2 0.00 1.12 0.95 0.15  
130857 0 2 0.00 1.12 0.95 0.15  
160857 0 2 0.00 1.12 0.95 0.15  
190857 0 2 0.00 1.12 0.95 0.15  
220857 0 2 0.00 1.12 0.95 0.15  
250857 0 2 0.00 1.12 0.95 0.15  
280857 0 2 0.00 1.12 0.95 0.15  
310857 0 2 0.00 1.12 0.95 0.15  
030957 0 2 0.00 1.12 0.95 0.15  
040858 0 2 0.00 1.12 0.95 0.15  
070858 0 2 0.00 1.12 0.95 0.15  
100858 0 2 0.00 1.12 0.95 0.15  
130858 0 2 0.00 1.12 0.95 0.15  
160858 0 2 0.00 1.12 0.95 0.15  
190858 0 2 0.00 1.12 0.95 0.15  
220858 0 2 0.00 1.12 0.95 0.15  
250858 0 2 0.00 1.12 0.95 0.15  
280858 0 2 0.00 1.12 0.95 0.15  
310858 0 2 0.00 1.12 0.95 0.15  
030958 0 2 0.00 1.12 0.95 0.15  
040859 0 2 0.00 1.12 0.95 0.15  
070859 0 2 0.00 1.12 0.95 0.15  
100859 0 2 0.00 1.12 0.95 0.15  
130859 0 2 0.00 1.12 0.95 0.15  
160859 0 2 0.00 1.12 0.95 0.15  
190859 0 2 0.00 1.12 0.95 0.15  
220859 0 2 0.00 1.12 0.95 0.15  
250859 0 2 0.00 1.12 0.95 0.15

280859	0	2	0.00	1.12	0.95	0.15
310859	0	2	0.00	1.12	0.95	0.15
030959	0	2	0.00	1.12	0.95	0.15
040860	0	2	0.00	1.12	0.95	0.15
070860	0	2	0.00	1.12	0.95	0.15
100860	0	2	0.00	1.12	0.95	0.15
130860	0	2	0.00	1.12	0.95	0.15
160860	0	2	0.00	1.12	0.95	0.15
190860	0	2	0.00	1.12	0.95	0.15
220860	0	2	0.00	1.12	0.95	0.15
250860	0	2	0.00	1.12	0.95	0.15
280860	0	2	0.00	1.12	0.95	0.15
310860	0	2	0.00	1.12	0.95	0.15
030960	0	2	0.00	1.12	0.95	0.15
040861	0	2	0.00	1.12	0.95	0.15
070861	0	2	0.00	1.12	0.95	0.15
100861	0	2	0.00	1.12	0.95	0.15
130861	0	2	0.00	1.12	0.95	0.15
160861	0	2	0.00	1.12	0.95	0.15
190861	0	2	0.00	1.12	0.95	0.15
220861	0	2	0.00	1.12	0.95	0.15
250861	0	2	0.00	1.12	0.95	0.15
280861	0	2	0.00	1.12	0.95	0.15
310861	0	2	0.00	1.12	0.95	0.15
030961	0	2	0.00	1.12	0.95	0.15
040862	0	2	0.00	1.12	0.95	0.15
070862	0	2	0.00	1.12	0.95	0.15
100862	0	2	0.00	1.12	0.95	0.15
130862	0	2	0.00	1.12	0.95	0.15
160862	0	2	0.00	1.12	0.95	0.15
190862	0	2	0.00	1.12	0.95	0.15
220862	0	2	0.00	1.12	0.95	0.15
250862	0	2	0.00	1.12	0.95	0.15
280862	0	2	0.00	1.12	0.95	0.15
310862	0	2	0.00	1.12	0.95	0.15
030962	0	2	0.00	1.12	0.95	0.15
040863	0	2	0.00	1.12	0.95	0.15
070863	0	2	0.00	1.12	0.95	0.15
100863	0	2	0.00	1.12	0.95	0.15
130863	0	2	0.00	1.12	0.95	0.15
160863	0	2	0.00	1.12	0.95	0.15
190863	0	2	0.00	1.12	0.95	0.15
220863	0	2	0.00	1.12	0.95	0.15
250863	0	2	0.00	1.12	0.95	0.15
280863	0	2	0.00	1.12	0.95	0.15

310863 0 2 0.00 1.12 0.95 0.15  
030963 0 2 0.00 1.12 0.95 0.15  
040864 0 2 0.00 1.12 0.95 0.15  
070864 0 2 0.00 1.12 0.95 0.15  
100864 0 2 0.00 1.12 0.95 0.15  
130864 0 2 0.00 1.12 0.95 0.15  
160864 0 2 0.00 1.12 0.95 0.15  
190864 0 2 0.00 1.12 0.95 0.15  
220864 0 2 0.00 1.12 0.95 0.15  
250864 0 2 0.00 1.12 0.95 0.15  
280864 0 2 0.00 1.12 0.95 0.15  
310864 0 2 0.00 1.12 0.95 0.15  
030964 0 2 0.00 1.12 0.95 0.15  
040865 0 2 0.00 1.12 0.95 0.15  
070865 0 2 0.00 1.12 0.95 0.15  
100865 0 2 0.00 1.12 0.95 0.15  
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280865 0 2 0.00 1.12 0.95 0.15  
310865 0 2 0.00 1.12 0.95 0.15  
030965 0 2 0.00 1.12 0.95 0.15  
040866 0 2 0.00 1.12 0.95 0.15  
070866 0 2 0.00 1.12 0.95 0.15  
100866 0 2 0.00 1.12 0.95 0.15  
130866 0 2 0.00 1.12 0.95 0.15  
160866 0 2 0.00 1.12 0.95 0.15  
190866 0 2 0.00 1.12 0.95 0.15  
220866 0 2 0.00 1.12 0.95 0.15  
250866 0 2 0.00 1.12 0.95 0.15  
280866 0 2 0.00 1.12 0.95 0.15  
310866 0 2 0.00 1.12 0.95 0.15  
030966 0 2 0.00 1.12 0.95 0.15  
040867 0 2 0.00 1.12 0.95 0.15  
070867 0 2 0.00 1.12 0.95 0.15  
100867 0 2 0.00 1.12 0.95 0.15  
130867 0 2 0.00 1.12 0.95 0.15  
160867 0 2 0.00 1.12 0.95 0.15  
190867 0 2 0.00 1.12 0.95 0.15  
220867 0 2 0.00 1.12 0.95 0.15  
250867 0 2 0.00 1.12 0.95 0.15  
280867 0 2 0.00 1.12 0.95 0.15  
310867 0 2 0.00 1.12 0.95 0.15

030967 0 2 0.00 1.12 0.95 0.15  
040868 0 2 0.00 1.12 0.95 0.15  
070868 0 2 0.00 1.12 0.95 0.15  
100868 0 2 0.00 1.12 0.95 0.15  
130868 0 2 0.00 1.12 0.95 0.15  
160868 0 2 0.00 1.12 0.95 0.15  
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280868 0 2 0.00 1.12 0.95 0.15  
310868 0 2 0.00 1.12 0.95 0.15  
030968 0 2 0.00 1.12 0.95 0.15  
040869 0 2 0.00 1.12 0.95 0.15  
070869 0 2 0.00 1.12 0.95 0.15  
100869 0 2 0.00 1.12 0.95 0.15  
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160869 0 2 0.00 1.12 0.95 0.15  
190869 0 2 0.00 1.12 0.95 0.15  
220869 0 2 0.00 1.12 0.95 0.15  
250869 0 2 0.00 1.12 0.95 0.15  
280869 0 2 0.00 1.12 0.95 0.15  
310869 0 2 0.00 1.12 0.95 0.15  
030969 0 2 0.00 1.12 0.95 0.15  
040870 0 2 0.00 1.12 0.95 0.15  
070870 0 2 0.00 1.12 0.95 0.15  
100870 0 2 0.00 1.12 0.95 0.15  
130870 0 2 0.00 1.12 0.95 0.15  
160870 0 2 0.00 1.12 0.95 0.15  
190870 0 2 0.00 1.12 0.95 0.15  
220870 0 2 0.00 1.12 0.95 0.15  
250870 0 2 0.00 1.12 0.95 0.15  
280870 0 2 0.00 1.12 0.95 0.15  
310870 0 2 0.00 1.12 0.95 0.15  
030970 0 2 0.00 1.12 0.95 0.15  
040871 0 2 0.00 1.12 0.95 0.15  
070871 0 2 0.00 1.12 0.95 0.15  
100871 0 2 0.00 1.12 0.95 0.15  
130871 0 2 0.00 1.12 0.95 0.15  
160871 0 2 0.00 1.12 0.95 0.15  
190871 0 2 0.00 1.12 0.95 0.15  
220871 0 2 0.00 1.12 0.95 0.15  
250871 0 2 0.00 1.12 0.95 0.15  
280871 0 2 0.00 1.12 0.95 0.15  
310871 0 2 0.00 1.12 0.95 0.15  
030971 0 2 0.00 1.12 0.95 0.15

040872 0 2 0.00 1.12 0.95 0.15  
070872 0 2 0.00 1.12 0.95 0.15  
100872 0 2 0.00 1.12 0.95 0.15  
130872 0 2 0.00 1.12 0.95 0.15  
160872 0 2 0.00 1.12 0.95 0.15  
190872 0 2 0.00 1.12 0.95 0.15  
220872 0 2 0.00 1.12 0.95 0.15  
250872 0 2 0.00 1.12 0.95 0.15  
280872 0 2 0.00 1.12 0.95 0.15  
310872 0 2 0.00 1.12 0.95 0.15  
030972 0 2 0.00 1.12 0.95 0.15  
040873 0 2 0.00 1.12 0.95 0.15  
070873 0 2 0.00 1.12 0.95 0.15  
100873 0 2 0.00 1.12 0.95 0.15  
130873 0 2 0.00 1.12 0.95 0.15  
160873 0 2 0.00 1.12 0.95 0.15  
190873 0 2 0.00 1.12 0.95 0.15  
220873 0 2 0.00 1.12 0.95 0.15  
250873 0 2 0.00 1.12 0.95 0.15  
280873 0 2 0.00 1.12 0.95 0.15  
310873 0 2 0.00 1.12 0.95 0.15  
030973 0 2 0.00 1.12 0.95 0.15  
040874 0 2 0.00 1.12 0.95 0.15  
070874 0 2 0.00 1.12 0.95 0.15  
100874 0 2 0.00 1.12 0.95 0.15  
130874 0 2 0.00 1.12 0.95 0.15  
160874 0 2 0.00 1.12 0.95 0.15  
190874 0 2 0.00 1.12 0.95 0.15  
220874 0 2 0.00 1.12 0.95 0.15  
250874 0 2 0.00 1.12 0.95 0.15  
280874 0 2 0.00 1.12 0.95 0.15  
310874 0 2 0.00 1.12 0.95 0.15  
030974 0 2 0.00 1.12 0.95 0.15  
040875 0 2 0.00 1.12 0.95 0.15  
070875 0 2 0.00 1.12 0.95 0.15  
100875 0 2 0.00 1.12 0.95 0.15  
130875 0 2 0.00 1.12 0.95 0.15  
160875 0 2 0.00 1.12 0.95 0.15  
190875 0 2 0.00 1.12 0.95 0.15  
220875 0 2 0.00 1.12 0.95 0.15  
250875 0 2 0.00 1.12 0.95 0.15  
280875 0 2 0.00 1.12 0.95 0.15  
310875 0 2 0.00 1.12 0.95 0.15  
030975 0 2 0.00 1.12 0.95 0.15  
040876 0 2 0.00 1.12 0.95 0.15

070876 0 2 0.00 1.12 0.95 0.15  
100876 0 2 0.00 1.12 0.95 0.15  
130876 0 2 0.00 1.12 0.95 0.15  
160876 0 2 0.00 1.12 0.95 0.15  
190876 0 2 0.00 1.12 0.95 0.15  
220876 0 2 0.00 1.12 0.95 0.15  
250876 0 2 0.00 1.12 0.95 0.15  
280876 0 2 0.00 1.12 0.95 0.15  
310876 0 2 0.00 1.12 0.95 0.15  
030976 0 2 0.00 1.12 0.95 0.15  
040877 0 2 0.00 1.12 0.95 0.15  
070877 0 2 0.00 1.12 0.95 0.15  
100877 0 2 0.00 1.12 0.95 0.15  
130877 0 2 0.00 1.12 0.95 0.15  
160877 0 2 0.00 1.12 0.95 0.15  
190877 0 2 0.00 1.12 0.95 0.15  
220877 0 2 0.00 1.12 0.95 0.15  
250877 0 2 0.00 1.12 0.95 0.15  
280877 0 2 0.00 1.12 0.95 0.15  
310877 0 2 0.00 1.12 0.95 0.15  
030977 0 2 0.00 1.12 0.95 0.15  
040878 0 2 0.00 1.12 0.95 0.15  
070878 0 2 0.00 1.12 0.95 0.15  
100878 0 2 0.00 1.12 0.95 0.15  
130878 0 2 0.00 1.12 0.95 0.15  
160878 0 2 0.00 1.12 0.95 0.15  
190878 0 2 0.00 1.12 0.95 0.15  
220878 0 2 0.00 1.12 0.95 0.15  
250878 0 2 0.00 1.12 0.95 0.15  
280878 0 2 0.00 1.12 0.95 0.15  
310878 0 2 0.00 1.12 0.95 0.15  
030978 0 2 0.00 1.12 0.95 0.15  
040879 0 2 0.00 1.12 0.95 0.15  
070879 0 2 0.00 1.12 0.95 0.15  
100879 0 2 0.00 1.12 0.95 0.15  
130879 0 2 0.00 1.12 0.95 0.15  
160879 0 2 0.00 1.12 0.95 0.15  
190879 0 2 0.00 1.12 0.95 0.15  
220879 0 2 0.00 1.12 0.95 0.15  
250879 0 2 0.00 1.12 0.95 0.15  
280879 0 2 0.00 1.12 0.95 0.15  
310879 0 2 0.00 1.12 0.95 0.15  
030979 0 2 0.00 1.12 0.95 0.15  
040880 0 2 0.00 1.12 0.95 0.15  
070880 0 2 0.00 1.12 0.95 0.15

100880	0	2	0.00	1.12	0.95	0.15
130880	0	2	0.00	1.12	0.95	0.15
160880	0	2	0.00	1.12	0.95	0.15
190880	0	2	0.00	1.12	0.95	0.15
220880	0	2	0.00	1.12	0.95	0.15
250880	0	2	0.00	1.12	0.95	0.15
280880	0	2	0.00	1.12	0.95	0.15
310880	0	2	0.00	1.12	0.95	0.15
030980	0	2	0.00	1.12	0.95	0.15
040881	0	2	0.00	1.12	0.95	0.15
070881	0	2	0.00	1.12	0.95	0.15
100881	0	2	0.00	1.12	0.95	0.15
130881	0	2	0.00	1.12	0.95	0.15
160881	0	2	0.00	1.12	0.95	0.15
190881	0	2	0.00	1.12	0.95	0.15
220881	0	2	0.00	1.12	0.95	0.15
250881	0	2	0.00	1.12	0.95	0.15
280881	0	2	0.00	1.12	0.95	0.15
310881	0	2	0.00	1.12	0.95	0.15
030981	0	2	0.00	1.12	0.95	0.15
040882	0	2	0.00	1.12	0.95	0.15
070882	0	2	0.00	1.12	0.95	0.15
100882	0	2	0.00	1.12	0.95	0.15
130882	0	2	0.00	1.12	0.95	0.15
160882	0	2	0.00	1.12	0.95	0.15
190882	0	2	0.00	1.12	0.95	0.15
220882	0	2	0.00	1.12	0.95	0.15
250882	0	2	0.00	1.12	0.95	0.15
280882	0	2	0.00	1.12	0.95	0.15
310882	0	2	0.00	1.12	0.95	0.15
030982	0	2	0.00	1.12	0.95	0.15
040883	0	2	0.00	1.12	0.95	0.15
070883	0	2	0.00	1.12	0.95	0.15
100883	0	2	0.00	1.12	0.95	0.15
130883	0	2	0.00	1.12	0.95	0.15
160883	0	2	0.00	1.12	0.95	0.15
190883	0	2	0.00	1.12	0.95	0.15
220883	0	2	0.00	1.12	0.95	0.15
250883	0	2	0.00	1.12	0.95	0.15
280883	0	2	0.00	1.12	0.95	0.15
310883	0	2	0.00	1.12	0.95	0.15
030983	0	2	0.00	1.12	0.95	0.15
2	3	0.0				
0.0	0.462	0.5				

Cowarts sandy loam; Hydrologic Group C;

100.00 0.0 0 0 0 0 0 0 0 0  
4300.0 0.0012 0.0E00  
2  
1 10.00 1.650 0.125 0.000 0.000  
9.01e-3 9.01e-3 0.000  
0.10 0.125 0.045 0.580 35.21  
2 90.00 1.500 0.244 0.000 0.000  
0.0460 0.0460 0.000  
2.0 0.244 0.144 0.174 10.56  
0 0  
YEAR 10      YEAR 10      YEAR 10 1  
6  
11 -----  
5 DAY  
RFLX TSER 0 0 1.E5  
EFLX TSER 0 0 1.E5  
ESLS TSER 0 0 1.E0  
RUNF TSER 0 0 1.E0  
PRCP TSER 0 0 1.E0

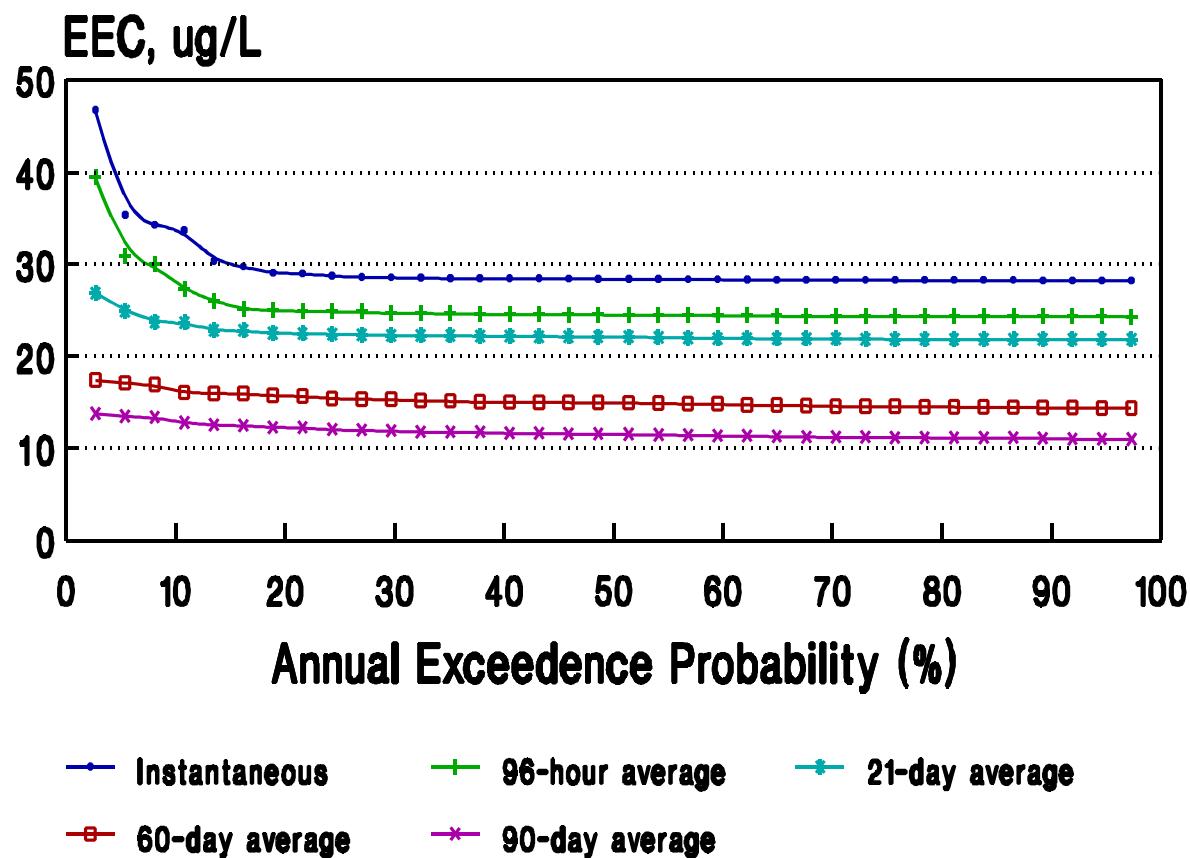
Chlorpyrifos use on sweet corn - Crisp County, Georgia  
 Major Land Resource Area 133A: Southern Coastal Plain  
 Cowarts Sandy Loam (Hydraulic Soil Group: C)  
 11 aerial applications at 1.0 lb a.i./ac

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	28.330	24.820	22.350	14.940	11.470	4.067
1949	28.310	24.400	21.930	14.480	11.130	3.920
1950	29.740	26.010	22.810	15.970	12.550	4.247
1951	28.300	24.380	21.920	14.960	11.580	4.033
1952	28.380	24.470	22.090	14.660	11.200	3.767
1953	28.280	24.360	21.940	15.720	12.480	4.094
1954	28.250	24.330	21.840	14.380	10.990	3.816
1955	28.240	24.320	21.830	14.370	10.970	3.616
1956	28.460	24.570	22.000	16.920	13.760	4.595
1957	28.440	24.530	22.190	15.010	11.610	4.303
1958	28.250	24.330	21.840	14.530	11.130	3.741
1959	28.230	24.310	21.820	14.550	11.250	3.836
1960	28.460	24.550	22.210	15.310	11.960	3.992
1961	46.730	39.430	26.880	17.410	13.400	4.711
1962	28.550	24.650	22.490	14.830	11.340	4.088
1963	28.390	24.490	22.100	14.810	11.520	3.939
1964	28.290	24.360	21.910	14.870	11.740	4.014
1965	29.030	24.910	22.280	15.150	11.900	4.192
1966	28.250	24.330	21.840	14.990	11.790	4.030
1967	30.310	24.980	22.410	15.030	11.580	4.128
1968	28.260	24.330	21.850	14.410	11.010	3.764
1969	28.350	24.440	22.060	15.400	12.020	4.047
1970	28.380	24.470	21.920	14.490	11.180	3.863
1971	34.270	29.950	23.750	15.950	12.260	4.134
1972	28.520	24.630	22.250	14.580	11.160	3.836
1973	28.260	24.340	21.850	14.470	11.140	3.756
1974	35.330	30.890	24.920	17.110	13.470	4.633
1975	28.420	24.510	22.120	16.070	12.780	4.489
1976	33.660	27.240	22.800	15.170	11.620	3.988
1977	28.280	24.360	21.880	14.690	11.280	3.954
1978	28.590	24.680	22.480	14.980	11.450	3.821
1979	28.240	24.320	21.830	14.540	11.190	3.784
1980	28.240	24.320	21.830	14.420	11.110	3.628
1981	28.440	24.540	22.150	14.710	11.350	4.009
1982	28.990	25.120	23.670	15.350	11.760	3.987
1983	28.730	24.860	22.260	15.700	12.280	4.252

upper  
 10th    33.843    28.053    23.694    16.325    12.966    4.521  
 percentile

MEAN OF ANNUAL VALUES =                          4.030  
 STANDARD DEVIATION OF ANNUAL VALUES =        .267  
 UPPER 90% CONFIDENCE LIMIT ON MEAN =            4.096

**EEC Plot - Chlorprifos Use on S. Corn  
Major Land Resource Area (MLRA): 133A  
Southern Coastal Plain**



**Cowarts Sandy Loam (HSG: C)  
11 Aerial Applications @ 1.0 lb a.i./ac**

Chlorpyrifos (JCL) January 31, 2000

Marshall Silty Clay Loam MLRA M-107, Pottawattamie County, IA

0.710	0.500	0	15.80	1	1		
4							
0.320	3.060	0.500	10.00	3	4.00	354.0	
1							
1	0.25	90.00	100.00	3	86	78	82
1	3						

0101 2105 1210

0.50 0.25 0.30

0.04 0.04 0.04

36

210548	260948	111048	1
210549	260949	111049	1
210550	260950	111050	1
210551	260951	111051	1
210552	260952	111052	1
210553	260953	111053	1
210554	260954	111054	1
210555	260955	111055	1
210556	260956	111056	1
210557	260957	111057	1
210558	260958	111058	1
210559	260959	111059	1
210560	260960	111060	1
210561	260961	111061	1
210562	260962	111062	1
210563	260963	111063	1
210564	260964	111064	1
210565	260965	111065	1
210566	260966	111066	1
210567	260967	111067	1
210568	260968	111068	1
210569	260969	111069	1
210570	260970	111070	1
210571	260971	111071	1
210572	260972	111072	1
210573	260973	111073	1
210574	260974	111074	1
210575	260975	111075	1
210576	260976	111076	1
210577	260977	111077	1
210578	260978	111078	1
210579	260979	111079	1
210580	260980	111080	1

210581 260981 111081 1  
210582 260982 111082 1  
210583 260983 111083 1

Application: 1 app. of 1.1 lbs A.I./acre, ground spray 100% eff. w/o%drift.

36 1 0

Chlorpyrifos: ASM: t<sub>1/2</sub> = 76.9 days, koc = 6070

140548 0 1 10.0 1.23 1.00 0.00  
140549 0 1 10.0 1.23 1.00 0.00  
140550 0 1 10.0 1.23 1.00 0.00  
140551 0 1 10.0 1.23 1.00 0.00  
140552 0 1 10.0 1.23 1.00 0.00  
140553 0 1 10.0 1.23 1.00 0.00  
140554 0 1 10.0 1.23 1.00 0.00  
140555 0 1 10.0 1.23 1.00 0.00  
140556 0 1 10.0 1.23 1.00 0.00  
140557 0 1 10.0 1.23 1.00 0.00  
140558 0 1 10.0 1.23 1.00 0.00  
140559 0 1 10.0 1.23 1.00 0.00  
140560 0 1 10.0 1.23 1.00 0.00  
140561 0 1 10.0 1.23 1.00 0.00  
140562 0 1 10.0 1.23 1.00 0.00  
140563 0 1 10.0 1.23 1.00 0.00  
140564 0 1 10.0 1.23 1.00 0.00  
140565 0 1 10.0 1.23 1.00 0.00  
140566 0 1 10.0 1.23 1.00 0.00  
140567 0 1 10.0 1.23 1.00 0.00  
140568 0 1 10.0 1.23 1.00 0.00  
140569 0 1 10.0 1.23 1.00 0.00  
140570 0 1 10.0 1.23 1.00 0.00  
140571 0 1 10.0 1.23 1.00 0.00  
140572 0 1 10.0 1.23 1.00 0.00  
140573 0 1 10.0 1.23 1.00 0.00  
140574 0 1 10.0 1.23 1.00 0.00  
140575 0 1 10.0 1.23 1.00 0.00  
140576 0 1 10.0 1.23 1.00 0.00  
140577 0 1 10.0 1.23 1.00 0.00  
140578 0 1 10.0 1.23 1.00 0.00  
140579 0 1 10.0 1.23 1.00 0.00  
140580 0 1 10.0 1.23 1.00 0.00  
140581 0 1 10.0 1.23 1.00 0.00  
140582 0 1 10.0 1.23 1.00 0.00  
140583 0 1 10.0 1.23 1.00 0.00

0 1 0.00

Marshall Silt Clay Loam, Group C;

150.00 0.0 0 0 0 0 0 0 0 0

4300.0 0.0012 0.00  
 4  
 1 10.00 1.250 0.495 0.000 0.000  
 9.01E-3 9.01E-3 0.000  
 0.1 0.495 0.265 1.740 105.6  
 2 35.00 1.250 0.495 0.000 0.000  
 9.01E-3 9.01E-3 0.000  
 1.0 0.495 0.265 1.740 105.6  
 3 100.00 1.300 0.416 0.000 0.000  
 0.0109 0.0109 0.000  
 5.0 0.416 0.216 0.116 7.04  
 4 5.00 1.300 0.416 0.000 0.000  
 0.0109 0.0109 0.000  
 5.0 0.416 0.196 0.058 3.52  
 0 0  
 WATR YEAR 10 PEST YEAR 10 CONC YEAR 10 1  
 6  
 11 -----  
 5 DAY  
 RFLX TSER 0 0 1.E5  
 EFLX TSER 0 0 1.E5  
 ESLS TSER 0 0 1.E0  
 RUNF TSER 0 0 1.E0  
 PRCP TSER 0 0 1.E0

Typical use rate for chlorpyrifos on corn - Pottawattamie County, Iowa  
 Major Land Resource Area 107: Iowa and Missouri Deep Loess Hills  
 Marshall Silty Clay Loam (Hydraulic Soil Group: C)  
 1 granular application at 1.1 lb a.i./ac

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

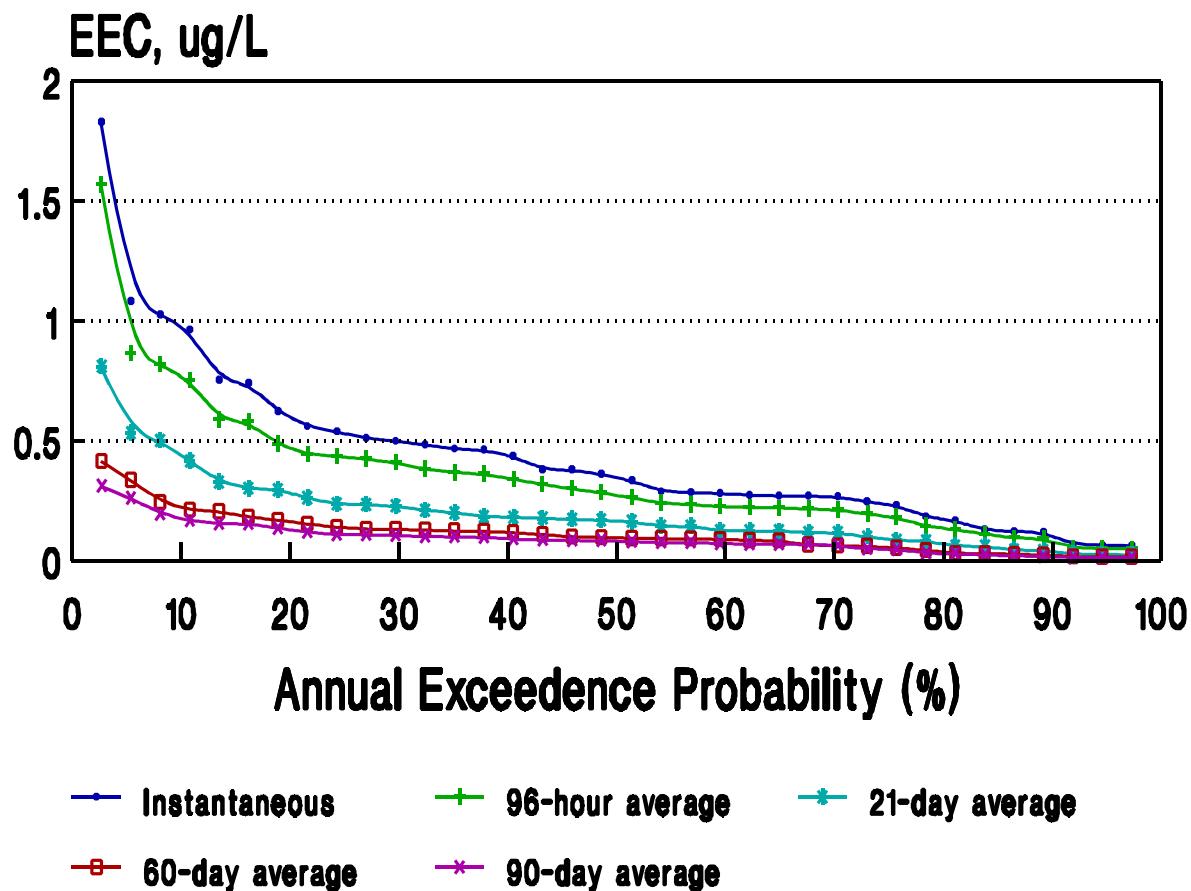
YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
------	------	---------	--------	--------	--------	--------

---	---	---	---	---	---	---
1948	.438	.342	.171	.111	.086	.030
1949	.464	.364	.175	.100	.089	.035
1950	.500	.411	.238	.156	.122	.043
1951	1.083	.867	.535	.338	.263	.098
1952	.561	.446	.236	.141	.110	.044
1953	.064	.053	.030	.020	.016	.009
1954	.131	.113	.062	.033	.026	.011
1955	.248	.196	.101	.063	.050	.022
1956	.363	.286	.184	.095	.078	.027
1957	.283	.242	.128	.068	.066	.031
1958	.336	.265	.165	.102	.081	.029
1959	.486	.384	.202	.134	.111	.048
1960	.468	.370	.187	.126	.107	.045
1961	.964	.755	.502	.246	.197	.078
1962	.754	.589	.304	.185	.157	.059
1963	.168	.132	.064	.033	.031	.014
1964	.742	.581	.331	.208	.157	.054
1965	1.027	.819	.419	.214	.170	.076
1966	.273	.222	.125	.093	.087	.035
1967	.381	.302	.230	.131	.102	.039
1968	.272	.219	.127	.086	.070	.041
1969	.269	.215	.119	.092	.075	.036
1970	.186	.146	.084	.056	.051	.020
1971	.540	.426	.213	.133	.104	.038
1972	.287	.225	.120	.064	.070	.028
1973	.381	.321	.179	.094	.071	.039
1974	.124	.097	.047	.025	.020	.010
1975	.067	.053	.027	.018	.014	.008
1976	.233	.183	.088	.046	.034	.011
1977	.290	.227	.146	.120	.100	.039
1978	.275	.237	.146	.088	.078	.037
1979	.066	.052	.027	.018	.016	.010
1980	.513	.438	.299	.171	.138	.050
1981	.122	.095	.045	.030	.023	.011
1982	1.830	1.570	.811	.417	.313	.103
1983	.624	.487	.264	.124	.092	.032

upper  
 10th    .983    .774    .444    .223    .178    .076  
 percentile

MEAN OF ANNUAL VALUES = .037  
 STANDARD DEVIATION OF ANNUAL VALUES = .023  
 UPPER 90% CONFIDENCE LIMIT ON MEAN = .043

**EEC Plot - Chlorprifos Use on Corn  
Major Land Resource Area (MLRA): 107  
Iowa and Missouri Deep Loess Hills**



**Marshall Silty Clay Loam (HSG: C)  
1 Granular Pre-plant @ 1.1 lb a.i./ac**

PRZM3 Input File, ms corn.inp

Location: MS, Crop: cotton MLRA 134

0.76	0.15	0	17.00	1	1				
4									
0.49	0.40	0.75	10.00	4	6.00	354.0			
3									
1	0.20	125.00	98.00	3	99	93	92	0.00	120.00
2	0.20	125.00	98.00	3	94	84	83	0.00	120.00
3	0.20	125.00	98.00	3	99	83	83	0.00	120.00
1	3								
0101	2109	2209							
0.63	0.16	0.18							
0.02	0.02	0.02							
2	3								
0105	0709	2209							
0.16	0.13	0.13							
0.02	0.02	0.02							
3	3								
0105	0709	2209							
0.16	0.13	0.09							
0.02	0.02	0.02							
36									
010548	070948	220948	1						
010549	070949	220949	2						
010550	070950	220950	3						
010551	070951	220951	1						
010552	070952	220952	2						
010553	070953	220953	3						
010554	070954	220954	1						
010555	070955	220955	2						
010556	070956	220956	3						
010557	070957	220957	1						
010558	070958	220958	2						
010559	070959	220959	3						
010560	070960	220960	1						
010561	070961	220961	2						
010562	070962	220962	3						
010563	070963	220963	1						
010564	070964	220964	2						
010565	070965	220965	3						
010566	070966	220966	1						
010567	070967	220967	2						
010568	070968	220968	3						
010569	070969	220969	1						
010570	070970	220970	2						

010571	070971	220971	3
010572	070972	220972	1
010573	070973	220973	2
010574	070974	220974	3
010575	070975	220975	1
010576	070976	220976	2
010577	070977	220977	3
010578	070978	220978	1
010579	070979	220979	2
010580	070980	220980	3
010581	070981	220981	1
010582	070982	220982	2
010583	070983	220983	3

Application: 1 granual apps of 1.1 lb a.i/a, @ 100% eff. w/0% drift

36 1 0 0

Chlorpyrifos Koc:6070 AeSM: T1/2=76.9 days

250448	0	1	10.0	1.23	1.00	0.00
250449	0	1	10.0	1.23	1.00	0.00
250450	0	1	10.0	1.23	1.00	0.00
250451	0	1	10.0	1.23	1.00	0.00
250452	0	1	10.0	1.23	1.00	0.00
250453	0	1	10.0	1.23	1.00	0.00
250454	0	1	10.0	1.23	1.00	0.00
250455	0	1	10.0	1.23	1.00	0.00
250456	0	1	10.0	1.23	1.00	0.00
250457	0	1	10.0	1.23	1.00	0.00
250458	0	1	10.0	1.23	1.00	0.00
250459	0	1	10.0	1.23	1.00	0.00
250460	0	1	10.0	1.23	1.00	0.00
250461	0	1	10.0	1.23	1.00	0.00
250462	0	1	10.0	1.23	1.00	0.00
250463	0	1	10.0	1.23	1.00	0.00
250464	0	1	10.0	1.23	1.00	0.00
250465	0	1	10.0	1.23	1.00	0.00
250466	0	1	10.0	1.23	1.00	0.00
250467	0	1	10.0	1.23	1.00	0.00
250468	0	1	10.0	1.23	1.00	0.00
250469	0	1	10.0	1.23	1.00	0.00
250470	0	1	10.0	1.23	1.00	0.00
250471	0	1	10.0	1.23	1.00	0.00
250472	0	1	10.0	1.23	1.00	0.00
250473	0	1	10.0	1.23	1.00	0.00
250474	0	1	10.0	1.23	1.00	0.00
250475	0	1	10.0	1.23	1.00	0.00
250476	0	1	10.0	1.23	1.00	0.00

250477 0 1 10.0 1.23 1.00 0.00  
 250478 0 1 10.0 1.23 1.00 0.00  
 250479 0 1 10.0 1.23 1.00 0.00  
 250480 0 1 10.0 1.23 1.00 0.00  
 250481 0 1 10.0 1.23 1.00 0.00  
 250482 0 1 10.0 1.23 1.00 0.00  
 250483 0 1 10.0 1.23 1.00 0.00  
 0 1 0.0  
 Soil Series: Loring silt loam; Hydrologic Group C  
 155.00 0.00 0 0 0 0 0 0 0 0  
 4300.0 0.0012 0.00  
 6  
 1 13.00 1.400 0.385 0.000 0.000 0.000  
 .00901 .00901 0.000  
 0.100 0.385 0.151 2.180 132.3  
 2 23.00 1.400 0.370 0.000 0.000 0.000  
 .00901 .00901 0.000  
 1.000 0.370 0.146 0.490 29.74  
 3 33.00 1.400 0.370 0.000 0.000 0.000  
 .00901 .00901 0.000  
 1.000 0.370 0.146 0.160 9.128  
 4 30.00 1.450 0.340 0.000 0.000 0.000  
 .00901 .00901 0.000  
 1.000 0.340 0.125 0.124 7.527  
 5 23.00 1.490 0.335 0.000 0.000 0.000  
 0.0109 0.0109 0.000  
 1.000 0.335 0.137 0.070 4.249  
 6 33.00 1.510 0.343 0.000 0.000 0.000  
 0.0109 0.0109 0.000  
 1.000 0.343 0.147 0.060 3.642  
 0  
 YEAR 5      YEAR 5      YEAR 5 1  
 6  
 11 -----  
 5    YEAR  
 RFLX TSER      1.0E+05  
 EFLX TSER      1.0E+05  
 ESLS TSER      1.0E+00  
 RUNF TSER      1.0E+00  
 PRCP TSER      1.0E+00

Typical use rate for chlorpyrifos on corn - Jackson County, Mississippi  
 Major Land Resource Area 134: Southern Mississippi Valley Silty Uplands  
 Loring Silt Loam (Hydraulic Soil Group: C)  
 1 granular application at 1.1 lb a.i./ac

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

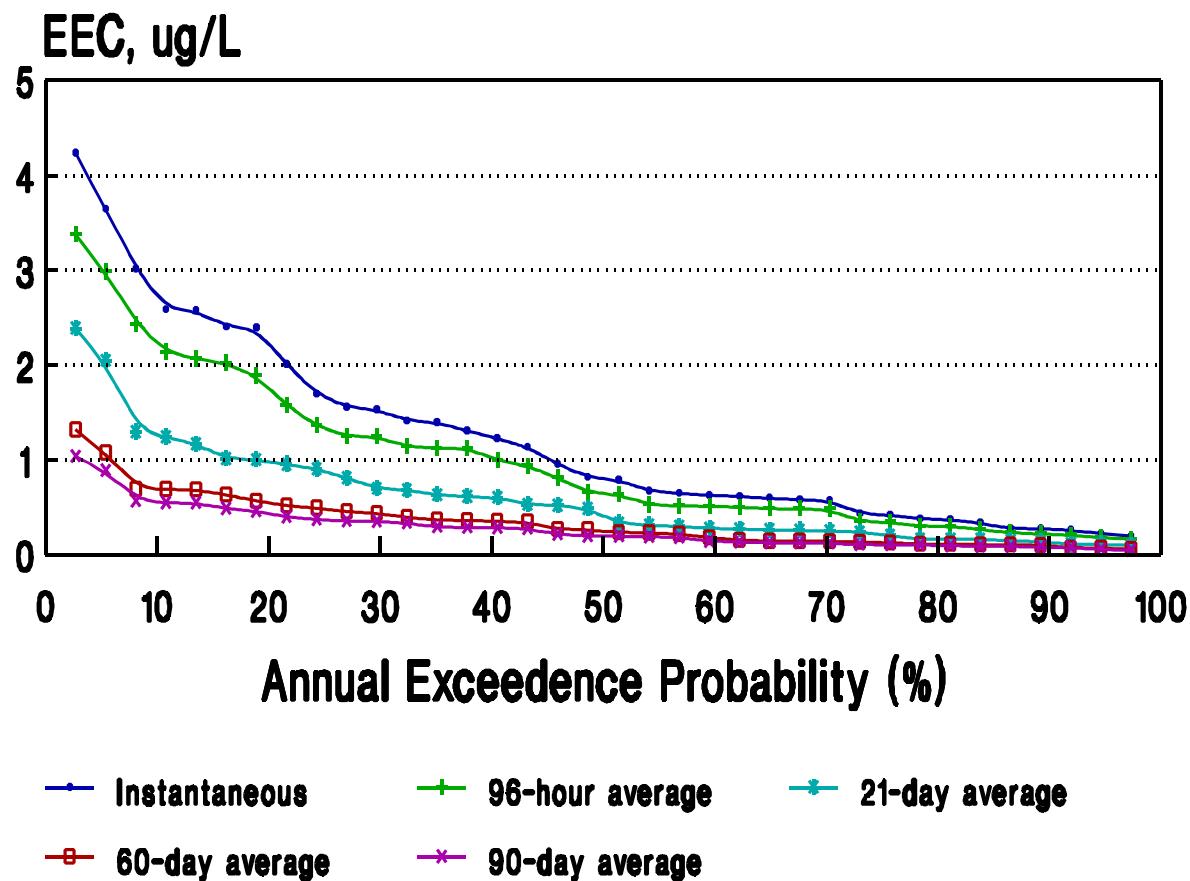
YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
------	------	---------	--------	--------	--------	--------

---	---	---	---	---	---	---
1948	.787	.636	.520	.342	.282	.112
1949	.375	.297	.161	.102	.102	.069
1950	1.134	.936	.528	.263	.196	.090
1951	.570	.480	.299	.232	.191	.092
1952	.220	.177	.111	.068	.055	.040
1953	.416	.344	.237	.138	.104	.042
1954	2.005	1.571	.806	.435	.331	.108
1955	2.573	2.016	.999	.491	.369	.129
1956	.369	.298	.162	.132	.125	.059
1957	2.392	2.133	1.242	.687	.543	.227
1958	3.641	2.982	2.047	1.074	.887	.325
1959	.331	.265	.146	.108	.092	.054
1960	1.393	1.122	.610	.391	.352	.143
1961	.429	.341	.199	.112	.086	.045
1962	.270	.230	.133	.103	.086	.044
1963	.259	.207	.160	.097	.077	.035
1964	1.554	1.243	.681	.359	.285	.110
1965	.613	.483	.255	.125	.099	.053
1966	1.529	1.246	.698	.350	.272	.129
1967	4.236	3.379	2.385	1.315	1.032	.353
1968	2.401	1.888	1.013	.565	.457	.171
1969	.576	.477	.250	.142	.125	.073
1970	1.693	1.357	.950	.513	.396	.138
1971	.593	.511	.308	.229	.189	.079
1972	.668	.524	.267	.150	.133	.089
1973	3.012	2.434	1.294	.684	.563	.218
1974	.952	.808	.486	.265	.213	.091
1975	.624	.500	.274	.217	.181	.081
1976	.647	.510	.259	.143	.119	.055
1977	.273	.215	.106	.070	.070	.040
1978	1.303	1.124	.602	.364	.291	.180
1979	1.223	.994	.628	.451	.351	.152
1980	.193	.161	.095	.057	.044	.029
1981	1.411	1.136	.904	.687	.544	.196
1982	2.584	2.064	1.166	.631	.485	.175
1983	.814	.653	.328	.181	.140	.061

upper  
 10th    2.712    2.223    1.258    .687    .549    .221  
 percentile

MEAN OF ANNUAL VALUES =                                0.113  
 STANDARD DEVIATION OF ANNUAL VALUES =            0.078  
 UPPER 90% CONFIDENCE LIMIT ON MEAN =            0.133

**EEC Plot - Chlorprifos Use on Corn  
Major Land Resource Area (MLRA): 134  
Southern Mississippi Valley Silty Upland**



**Loring Silt Loam (HSG: C)  
1 Granular Preplant @ 1.1 lb a.i./ac**

## **SITES/SCENARIOS FOR PEANUTS**

This report describes the Tier II estimated environmental concentration (EEC) computer modeling for chlorpyrifos use on peanuts. The purpose of this analysis is to generate an aquatic exposure estimates for use in a refined ecological risk assessment for this chemical. This Tier II EEC calculation uses a single site which represents a high exposure scenario for the use of Chlorpyrifos. It employs the standard scenario which represents a 10 hectare field draining into a 1 hectare pond, 2 m deep with no outlet. The weather and agricultural practice are simulated at the site over 36 years so that the ten year exceedence probability EEC at that site can be estimated. The EEC's generated in this analysis were calculated using PRZM2 for simulating runoff from the agricultural field and EXAMS 2.94 for estimating environmental fate and transport in surface water.

The site is a peanut field in Crisp County, Georgia in MLRA 153A. The soil at the site is a Tifton loamy sand. Soil parameters were taken from the PIC database and the 1987 National Resources Inventory. The Tifton loamy sand is hydrologic group C soil and SCS curve numbers were generated based on this grouping and the plant cover (United States Soil Conservation Service, 1972). The weather data file is part of the PIRANHA shell and is used to represent the weather for MLRA 153A.

The parameters used in PRZM2 to describe the scenario are tabulated in Table 1 attached. The chemical and environment parameters used in the EXAMS program are tabulated in Table 2 also attached to this report. The site were selected to represent peanut sites in the south-eastern United States that are likely to present high exposure to aquatic organisms.

### **Procedure**

The PRZM simulation was run for a period of 36 years from 1948 to 1983 with application of the pesticide twice per year at the label rate of 2.0 pounds per acre of active ingredient for each application. EXAMS loading (PRZM3.12EXAMS2.97.5) files were developed to have 5% of each application rate applied to the pond as spray drift. EXAMS was run for all 36 years in mode 3. The yearly maxima, largest yearly peaks, maximum 96-hour means and largest yearly 21-day means were extracted from the REPORT.XMS file produced by EXAMS. The largest yearly 60- and 90-day means were calculated by PEO from daily concentration values generated by EXAMS. The 10 year return EEC's (or 10% yearly exceedence EEC's) show on the graphs and listed in the attached Tables were calculated by linear interpolation between the third and fourth largest values. Input files for these analyses are also attached to the end of this report.

### **Limitations of this Analysis**

There are several factors which limit the accuracy and precision of this analysis including the selection of the high exposure scenarios, the quality of the input data, the ability of the models to represent the real world, and the number of years that were modeled.

Scenarios that are selected for use in Tier 2 EEC calculations are ones that likely to produce

relatively high concentrations in the aquatic environment. Each scenario should represent a real site to which the pesticide in question is likely to be applied. Sites should be extreme enough to provide conservative estimates of the EEC, but not so extreme that the model cannot properly simulate the fate and transport processes at the site. Currently, sites are chosen by best professional judgement to represent sites which generally produce EEC's larger than 90% of all sites use for that crop. The EEC's in this analysis are accurate only to the extent that the site represents this hypothetical high exposure site. Another potentially limiting part of the site selection is the use of the standard pond with no outlet. A single Georgia pond may not be a good representation of all water bodies in the state. It does, however, give a conservative estimate of an estimated environmental concentration (EEC) in a water body that serves as a surrogate for all sensitive water bodies and provides a level playing field on which most pesticides can be judged on equal terms.

The models themselves represent a limitation on the analysis quality. While the models are some of the best environmental fate estimation tools available, they have significant limitations in their ability to represent some processes. The most substantial limitation in this analysis is the handling of spray drift, which is estimated as a straight 5% of the application rate reaching the pond for each application. A second major limitation of the models is the lack of validation at the field level for pesticide runoff. While several of the algorithms (volume of runoff water, eroded sediment mass, are well validated and well understood, no adequate validation has yet been made of PRZM2 for the amount of pesticide transported in runoff events for all combinations of sites and pesticide fate characteristics. Other limitations of the models include: inability to handle within site variation (spatial variability), lack of crop growth algorithms, and overly simple soil water transport algorithms (i.e., the "tipping bucket" method).

A final limitation is that only thirty-six years of weather data was available for the site. Consequently there is approximately 1 chance in 20 that the true 10% exceedence EEC's are larger than the maximum EEC in the calculated in the analysis.

#### PRZM3 Input File, peanut.inp (January 28, 2000)

Location: GA, Crop: peanuts MLRA 153A

```
0.75 0.15 0 30.00 1 1
4
0.17 0.54 0.50 10.00      3 1.00 354.0
1
1 0.10 45.00 80.00      3 86 78 82 0.00 100.00
1 3
0101 21 9 2209
0.46 0.45 0.46
0.17 0.17 0.17
36
010548 160948 011048 1
010549 160949 011049 1
010550 160950 011050 1
010551 160951 011051 1
010552 160952 011052 1
```

010553	160953	011053	1
010554	160954	011054	1
010555	160955	011055	1
010556	160956	011056	1
010557	160957	011057	1
010558	160958	011058	1
010559	160959	011059	1
010560	160960	011060	1
010561	160961	011061	1
010562	160962	011062	1
010563	160963	011063	1
010564	160964	011064	1
010565	160965	011065	1
010566	160966	011066	1
010567	160967	011067	1
010568	160968	011068	1
010569	160969	011069	1
010570	160970	011070	1
010571	160971	011071	1
010572	160972	011072	1
010573	160973	011073	1
010574	160974	011074	1
010575	160975	011075	1
010576	160976	011076	1
010577	160977	011077	1
010578	160978	011078	1
010579	160979	011079	1
010580	160980	011080	1
010581	160981	011081	1
010582	160982	011082	1
010583	160983	011083	1

Application: 2 ground appl. @ 2.0 lb/ac w/95% eff & 1.4% drift

72    1    0    0

Chlorpyrifos t1/2 = 76.9 days, KOC = 6070

200448	0	2	0.00	2.24	0.95	.014
010648	0	2	0.00	2.24	0.95	.014
200449	0	2	0.00	2.24	0.95	.014
010649	0	2	0.00	2.24	0.95	.014
200450	0	2	0.00	2.24	0.95	.014
010650	0	2	0.00	2.24	0.95	.014
200451	0	2	0.00	2.24	0.95	.014
010651	0	2	0.00	2.24	0.95	.014
200452	0	2	0.00	2.24	0.95	.014
010652	0	2	0.00	2.24	0.95	.014
200453	0	2	0.00	2.24	0.95	.014
010653	0	2	0.00	2.24	0.95	.014

200454 0 2 0.00 2.24 0.95 .014  
010654 0 2 0.00 2.24 0.95 .014  
200455 0 2 0.00 2.24 0.95 .014  
010655 0 2 0.00 2.24 0.95 .014  
200456 0 2 0.00 2.24 0.95 .014  
010656 0 2 0.00 2.24 0.95 .014  
200457 0 2 0.00 2.24 0.95 .014  
010657 0 2 0.00 2.24 0.95 .014  
200458 0 2 0.00 2.24 0.95 .014  
010658 0 2 0.00 2.24 0.95 .014  
200459 0 2 0.00 2.24 0.95 .014  
010659 0 2 0.00 2.24 0.95 .014  
200460 0 2 0.00 2.24 0.95 .014  
010660 0 2 0.00 2.24 0.95 .014  
200461 0 2 0.00 2.24 0.95 .014  
010661 0 2 0.00 2.24 0.95 .014  
200462 0 2 0.00 2.24 0.95 .014  
010662 0 2 0.00 2.24 0.95 .014  
200463 0 2 0.00 2.24 0.95 .014  
010663 0 2 0.00 2.24 0.95 .014  
200464 0 2 0.00 2.24 0.95 .014  
010664 0 2 0.00 2.24 0.95 .014  
200465 0 2 0.00 2.24 0.95 .014  
010665 0 2 0.00 2.24 0.95 .014  
200466 0 2 0.00 2.24 0.95 .014  
010666 0 2 0.00 2.24 0.95 .014  
200467 0 2 0.00 2.24 0.95 .014  
010667 0 2 0.00 2.24 0.95 .014  
200468 0 2 0.00 2.24 0.95 .014  
010668 0 2 0.00 2.24 0.95 .014  
200469 0 2 0.00 2.24 0.95 .014  
010669 0 2 0.00 2.24 0.95 .014  
200470 0 2 0.00 2.24 0.95 .014  
010670 0 2 0.00 2.24 0.95 .014  
200471 0 2 0.00 2.24 0.95 .014  
010671 0 2 0.00 2.24 0.95 .014  
200472 0 2 0.00 2.24 0.95 .014  
010672 0 2 0.00 2.24 0.95 .014  
200473 0 2 0.00 2.24 0.95 .014  
010673 0 2 0.00 2.24 0.95 .014  
200474 0 2 0.00 2.24 0.95 .014  
010674 0 2 0.00 2.24 0.95 .014  
200475 0 2 0.00 2.24 0.95 .014  
010675 0 2 0.00 2.24 0.95 .014  
200476 0 2 0.00 2.24 0.95 .014

010676 0 2 0.00 2.24 0.95 .014  
200477 0 2 0.00 2.24 0.95 .014  
010677 0 2 0.00 2.24 0.95 .014  
200478 0 2 0.00 2.24 0.95 .014  
010678 0 2 0.00 2.24 0.95 .014  
200479 0 2 0.00 2.24 0.95 .014  
010679 0 2 0.00 2.24 0.95 .014  
200480 0 2 0.00 2.24 0.95 .014  
010680 0 2 0.00 2.24 0.95 .014  
200481 0 2 0.00 2.24 0.95 .014  
010681 0 2 0.00 2.24 0.95 .014  
200482 0 2 0.00 2.24 0.95 .014  
010682 0 2 0.00 2.24 0.95 .014  
200483 0 2 0.00 2.24 0.95 .014  
010683 0 2 0.00 2.24 0.95 .014

2 3 0.0

0.0 0.023 0.5

Tifton Loamy Sand; Hydrologic Group C;

150.00 0.0 0 0 0 0 0 0 0 0  
4300.0 0.0012 00.00

3

1 10.00 1.300 0.160 0.000 0.000  
9.01E-3 9.01E-3 0.000  
0.1 0.160 0.080 0.580 35.2  
2 15.00 1.300 0.160 0.000 0.000  
9.01E-3 9.01E-3 0.000  
1.0 0.160 0.080 0.580 35.2  
3 125.00 1.600 0.317 0.000 0.000  
0.0109 0.0109 0.000  
5.0 0.317 0.197 0.174 10.6  
0 0

WATR YEAR 10 PEST YEAR 10 CONC YEAR 10 1

6

11 -----

5 DAY

RFLX TSER 0 0 1.E5  
EFLX TSER 0 0 1.E5  
ESLS TSER 0 0 1.E0  
RUNF TSER 0 0 1.E0  
PRCP TSER 0 0 1.E0

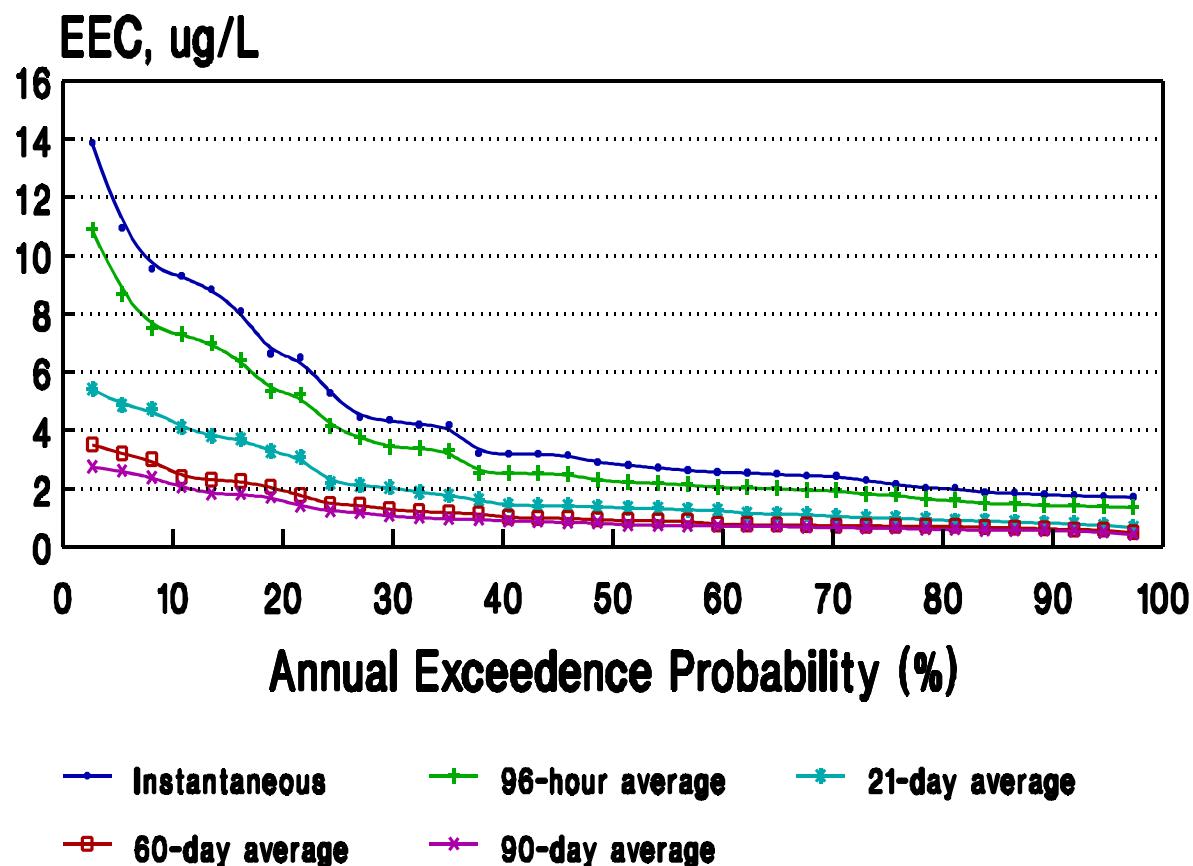
Chlorpyrifos use on peanuts - Crisp County, Georgia  
 Major Land Resource Area 153A: Atlantic Coast Flatwoods  
 Tifton Loamy Sand (Hydraulic Soil Group: C)  
 2 ground applications at 2.0 lb a.i./ac

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	1.792	1.416	.734	.589	.513	.225
1949	2.150	1.796	1.006	.722	.648	.305
1950	10.940	8.675	4.862	3.196	2.613	.961
1951	3.192	2.527	1.378	.899	.752	.376
1952	2.017	1.609	.902	.658	.575	.260
1953	1.769	1.413	.811	.672	.574	.268
1954	2.028	1.619	.857	.715	.576	.228
1955	1.857	1.489	1.054	.778	.722	.342
1956	3.149	2.499	1.612	1.181	.945	.356
1957	2.809	2.226	1.342	.728	.605	.296
1958	2.435	1.946	1.115	.774	.687	.384
1959	2.281	1.799	.902	.723	.655	.300
1960	2.631	2.183	1.319	.753	.728	.349
1961	6.624	5.231	3.277	1.777	1.406	.542
1962	9.306	7.294	4.106	2.313	1.810	.665
1963	4.188	3.391	2.108	1.439	1.240	.484
1964	3.205	2.528	1.278	1.019	.900	.382
1965	6.492	5.343	3.089	2.061	1.719	.646
1966	13.870	10.880	5.414	3.514	2.742	.967
1967	2.503	2.006	1.145	.932	.874	.377
1968	2.898	2.290	1.268	.759	.617	.267
1969	8.844	6.983	3.806	2.398	2.060	.749
1970	1.859	1.479	.823	.599	.556	.281
1971	1.732	1.397	.954	.721	.718	.328
1972	5.273	4.150	2.042	1.149	.960	.383
1973	9.538	7.497	4.733	3.001	2.378	.894
1974	4.182	3.297	1.880	1.297	1.063	.445
1975	2.715	2.138	1.140	.989	.839	.357
1976	8.094	6.403	3.702	2.255	1.828	.679
1977	2.546	2.034	1.423	.991	.838	.363
1978	2.566	2.040	1.418	.896	.748	.316
1979	4.353	3.423	1.777	1.214	1.008	.439
1980	1.704	1.349	.680	.497	.437	.192
1981	3.185	2.537	1.433	.914	.711	.359
1982	4.439	3.750	2.206	1.466	1.184	.512
1983	2.442	1.938	.989	.628	.664	.298

upper  
 10th    9.376    7.355    4.294    2.579    2.155    .792  
 percentile

MEAN OF ANNUAL VALUES =                                0.433  
 STANDARD DEVIATION OF ANNUAL VALUES =            0.204  
 UPPER 90% CONFIDENCE LIMIT ON MEAN =            0.483

**EEC Plot - Chlorprifos Use on Peanuts  
Major Land Resource Area (MLRA): 153A  
Atlantic Coast Flatwoods**



**Tifton Loamy Sand (HSG: C)  
2 Ground Applications @ 2.0 lb a.i./ac**

## SITES/SCENARIOS FOR COTTON

This report describes the Tier II estimated environmental concentration (EEC) computer modeling for chlorpyrifos use on cotton. The purpose of this analysis is to generate aquatic exposure estimates for use in a refined ecological risk assessment for this chemical. This Tier II EEC calculation uses a single cotton site which represents a high exposure scenario for the use of chlorpyrifos on this crop. It uses the standard scenario which represents a 10 hectare field draining into a 1 hectare pond, 2 meters deep with no outlet. Evaporation from the pond is considered to be equal in magnitude to inflow into the pond from surface runoff.

The cotton growing area chosen for this computer simulation is Yazoo County, Mississippi. This is an area in the heart of the south-central cotton growing region and provides a site which contains a highly erodible soil and a very erosive rainfall. It is therefore ideal for modeling pesticides which move off of the site dissolved in runoff water or are strongly adsorbed to eroded soil or are a combination of each as in the case of chlorpyrifos. All cotton cultural practices represented are those legal under the conservation compliance section of the Food Security Act.

The weather and agricultural practices are modelled at the site over 36 years so that the ten year exceedence probability EEC at that site can be estimated. Weather for the PRZM2 simulations is thirty-six years of actual data for NOAA Weather Station W03940 in Jackson, MS as developed for MLRA 134 for the PRZM program. Average rainfall is 50.0 inches per year. A total of 29.4 percent of this becomes runoff in this simulation.

The Tier 2 one in ten year return period EEC's are graphed and listed below. The EEC's have been calculated so that in any given year, there is a 10% probability that the maximum of the average concentrations for each duration in that year will equal or exceed the EEC at the site. Durations for which average concentrations are calculated are those which correspond to the length of relevant toxicity tests.

The EEC's generated in this analysis were calculated using PRZM3.12 for simulating runoff from the agricultural field and EXAMS 2.97.5 for estimating environmental fate and transport in surface water. The parameters used in PRZM3.12 to describe the scenario are tabulated in Table 1 attached. The chemical and environment parameters used in the EXAMS program are tabulated in Table 2 also attached to this report. Copies of the PRZM3.12 input files are also attached.

This simulation attempts to model cotton culture in the hill area of the county. Approximately forty percent of Yazoo county agricultural area is in the Delta region and the other sixty percent is in the hill region. Roughly 100,000 acres in the hill area is planted in cotton. Slopes in the hill area range from two to six percent. Slope lengths as used in the Universal Soil Loss Equation (USLE) vary from 75-150 feet.

The best cotton soil in the hill region of Yazoo county, Morganfield silt loam, is very restricted in area. The most common soil in the hill area of the county is the Loring silt loam and is used in this simulation. It is a very highly erodible soil with a USLE K value of 0.49 and has a fragipan at a depth of about two feet. Soil characteristics are estimated by the PIC input file facility for

PRZM for the Loring silt loam.

Cotton culture is restricted by the provisions of the conservation compliance portion of the Food Security Act. Loring silt loam has a tolerance (T) of three tons of soil loss per acre per year. The Act limits soil loss for cotton to 4T (four times the tolerance value). Cotton farmers on Loring soil therefore are held to a long term average soil loss of 12 tons per acre per year based on USLE calculations. Farmers achieve this limit of soil loss either through conventional practices with terracing (75%) or through a no-till scheme (6% and growing rapidly). One common scheme is a rotation including two years of no-till followed by one year of conventional cotton during which time the beds are rebuilt. The latter scheme is the one modelled in this simulation because it provides the worst legal case for soil erosion occurring one out of every three years.

The conservation compliance farm plan which is likely to provide the least protection for aquatic resources is the rotation of one year of conventional tillage with two years of no-till. Heavier runoff and soil erosion are likely during the years in which the conventional tillage is practiced. USDA runoff experiments on Loring soils in Mississippi show a water yield of 27 percent from no-till soybeans and 35 percent from conventional soybeans. A rotation of one year of conventional cotton followed by two years of no-till is modeled in this exercise.

When the PRZM2 model is run with curve numbers chosen from standard tables for row crops under this scenario, the runoff volume is very small compared to the actual runoff volume expected from USDA runoff studies conducted on this soil. The models were therefore calibrated by raising the curve numbers to give a long-term average runoff of 30 percent of rainfall.

Soil loss ratios (USLE C values) were developed with the Revised Universal Soil Loss Equation (RUSLE) computer model. The scenario assumes moderate crop residues remain on the field after harvest and that weeds which normally grow in the cotton fields in winter are not removed and therefore provide protection against erosion during that period. Weeds are typically killed with herbicide (Lindane or Roundup) just prior to planting.

Application of Chlorpyrifos® to cotton in the hill area of Yazoo County is by ground or by aerial application. USDA field tests for cotton in the area show that 75 to 90 percent of the chemical applied is actually deposited on the cotton plant. Modeling with PRZM2 assumed an overall 75 percent application efficiency. This is modeled in PRZM2 by reducing the application rate to 75 percent of the label rate.

## Procedure

The PRZM simulation was run for a period of 36 years from 1948 to 1983 with application of the pesticide six times per year. EXAMS loading (PRZM3.12-EXAMS 2.97.5) files were developed to have 5% of each application rate applied to the pond as spray drift. EXAMS was run for all 36 years in mode 3. The yearly maximums, largest yearly peaks, maximum 96-hour means and largest yearly 21-day means were extracted from the REPORT.XMS file produced by EXAMS. The largest yearly 60- and 90-day means were calculated by the PEO program from daily

concentration values generated by EXAMS. The 10 year return EEC's (or 10% yearly exceedence EEC's) are shown on attached graphs and are listed in attached tables. They were calculated by linear interpolation between the third and fourth largest values.

### **Limitations of this Analysis**

There are several factors which may limit the accuracy and precision of this analysis including the selection of the high exposure scenarios, the quality of the input data, the ability of the models to represent the real world, and the number of years that were modeled.

Scenarios that are selected for use in Tier 2 EEC calculations are ones that likely to produce large concentrations in the aquatic environment. Each scenario should represent a real site to which the pesticide in question is likely to be applied. Sites should be extreme enough to provide conservative estimates of the EEC, but not so extreme that the model cannot properly simulate the fate and transport processes at the site. Currently, sites are chosen by best professional judgement to represent sites which generally produce EEC's larger than 90% of all sites use for that crop. The EEC's in this analysis are accurate to the extent that the site represents this hypothetical high exposure site. Another potentially limiting aspect of the analysis is the use of the standard Georgia pond which may or may not be an adequate representation of a Mississippi pond.

The models themselves may also represent a limitation on the accuracy of the analysis. While the models are some of the best environmental fate estimation tools available, they have significant limitations in their ability to represent some processes. The most substantial limitation in this analysis is the handling of spray drift, which is estimated as a straight 5% of the application rate reaching the pond for each application. A second major limitation of the models is the lack of validation at the field level for pesticide runoff. While several of the algorithms (volume of runoff water, eroded sediment mass, are well validated and well understood, no adequate validation has yet been made of PRZM2 for the amount of pesticide transported in runoff events for all combinations of sites and pesticide fate characteristics. Other limitations of the models include: inability to handle within site variation (spatial variability), lack of crop growth algorithms, and overly simple soil water transport algorithms (i.e., the "tipping bucket" method).

A final limitation is that only thirty-six years of weather data was available for the site. Consequently there is approximately 1 chance in 20 that the true 10% exceedence EEC's are larger than the maximum EEC in the calculated in the analysis.

PRZM3 Input File, cotton.inp (January 28, 2000) jcl

Location: MS, Crop: cotton MLRA 134

0.76	0.15	0	17.00	1	1
4					
0.49	0.40	0.75	10.00	4	6.00 354.0
3					
1	0.20	125.00	98.00	3 99 93 92	0.00 120.00
2	0.20	125.00	98.00	3 94 84 83	0.00 120.00

3	0.20	125.00	98.00	3	99	83	83	0.00	120.00
1	3								
0101	2109	2209							
0.63	0.16	0.18							
0.02	0.02	0.02							
2	3								
0105	0709	2209							
0.16	0.13	0.13							
0.02	0.02	0.02							
3	3								
0105	0709	2209							
0.16	0.13	0.09							
0.02	0.02	0.02							
36									
010548	070948	220948		1					
010549	070949	220949		2					
010550	070950	220950		3					
010551	070951	220951		1					
010552	070952	220952		2					
010553	070953	220953		3					
010554	070954	220954		1					
010555	070955	220955		2					
010556	070956	220956		3					
010557	070957	220957		1					
010558	070958	220958		2					
010559	070959	220959		3					
010560	070960	220960		1					
010561	070961	220961		2					
010562	070962	220962		3					
010563	070963	220963		1					
010564	070964	220964		2					
010565	070965	220965		3					
010566	070966	220966		1					
010567	070967	220967		2					
010568	070968	220968		3					
010569	070969	220969		1					
010570	070970	220970		2					
010571	070971	220971		3					
010572	070972	220972		1					
010573	070973	220973		2					
010574	070974	220974		3					
010575	070975	220975		1					
010576	070976	220976		2					
010577	070977	220977		3					
010578	070978	220978		1					

010579	070979	220979	2
010580	070980	220980	3
010581	070981	220981	1
010582	070982	220982	2
010583	070983	220983	3

Application: 6 aerial apps of 1.0 lb a.i/a, @ 95% eff. w/15% drift

216	1	0	0
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Chlorpyrifos Koc:6070 AeSM: T1/2=76.9 days

070848	0	2	0.00	1.12	0.95	0.15
100848	0	2	0.00	1.12	0.95	0.15
130848	0	2	0.00	1.12	0.95	0.15
160848	0	2	0.00	1.12	0.95	0.15
190848	0	2	0.00	1.12	0.95	0.15
220848	0	2	0.00	1.12	0.95	0.15
070849	0	2	0.00	1.12	0.95	0.15
100849	0	2	0.00	1.12	0.95	0.15
130849	0	2	0.00	1.12	0.95	0.15
160849	0	2	0.00	1.12	0.95	0.15
190849	0	2	0.00	1.12	0.95	0.15
220849	0	2	0.00	1.12	0.95	0.15
070850	0	2	0.00	1.12	0.95	0.15
100850	0	2	0.00	1.12	0.95	0.15
130850	0	2	0.00	1.12	0.95	0.15
160850	0	2	0.00	1.12	0.95	0.15
190850	0	2	0.00	1.12	0.95	0.15
220850	0	2	0.00	1.12	0.95	0.15
070851	0	2	0.00	1.12	0.95	0.15
100851	0	2	0.00	1.12	0.95	0.15
130851	0	2	0.00	1.12	0.95	0.15
160851	0	2	0.00	1.12	0.95	0.15
190851	0	2	0.00	1.12	0.95	0.15
220851	0	2	0.00	1.12	0.95	0.15
070852	0	2	0.00	1.12	0.95	0.15
100852	0	2	0.00	1.12	0.95	0.15
130852	0	2	0.00	1.12	0.95	0.15
160852	0	2	0.00	1.12	0.95	0.15
190852	0	2	0.00	1.12	0.95	0.15
220852	0	2	0.00	1.12	0.95	0.15
070853	0	2	0.00	1.12	0.95	0.15
100853	0	2	0.00	1.12	0.95	0.15
130853	0	2	0.00	1.12	0.95	0.15
160853	0	2	0.00	1.12	0.95	0.15
190853	0	2	0.00	1.12	0.95	0.15
220853	0	2	0.00	1.12	0.95	0.15
070854	0	2	0.00	1.12	0.95	0.15

100854 0 2 0.00 1.12 0.95 0.15  
130854 0 2 0.00 1.12 0.95 0.15  
160854 0 2 0.00 1.12 0.95 0.15  
190854 0 2 0.00 1.12 0.95 0.15  
220854 0 2 0.00 1.12 0.95 0.15  
070855 0 2 0.00 1.12 0.95 0.15  
100855 0 2 0.00 1.12 0.95 0.15  
130855 0 2 0.00 1.12 0.95 0.15  
160855 0 2 0.00 1.12 0.95 0.15  
190855 0 2 0.00 1.12 0.95 0.15  
220855 0 2 0.00 1.12 0.95 0.15  
070856 0 2 0.00 1.12 0.95 0.15  
100856 0 2 0.00 1.12 0.95 0.15  
130856 0 2 0.00 1.12 0.95 0.15  
160856 0 2 0.00 1.12 0.95 0.15  
190856 0 2 0.00 1.12 0.95 0.15  
220856 0 2 0.00 1.12 0.95 0.15  
070857 0 2 0.00 1.12 0.95 0.15  
100857 0 2 0.00 1.12 0.95 0.15  
130857 0 2 0.00 1.12 0.95 0.15  
160857 0 2 0.00 1.12 0.95 0.15  
190857 0 2 0.00 1.12 0.95 0.15  
220857 0 2 0.00 1.12 0.95 0.15  
070858 0 2 0.00 1.12 0.95 0.15  
100858 0 2 0.00 1.12 0.95 0.15  
130858 0 2 0.00 1.12 0.95 0.15  
160858 0 2 0.00 1.12 0.95 0.15  
190858 0 2 0.00 1.12 0.95 0.15  
220858 0 2 0.00 1.12 0.95 0.15  
070859 0 2 0.00 1.12 0.95 0.15  
100859 0 2 0.00 1.12 0.95 0.15  
130859 0 2 0.00 1.12 0.95 0.15  
160859 0 2 0.00 1.12 0.95 0.15  
190859 0 2 0.00 1.12 0.95 0.15  
220859 0 2 0.00 1.12 0.95 0.15  
070860 0 2 0.00 1.12 0.95 0.15  
100860 0 2 0.00 1.12 0.95 0.15  
130860 0 2 0.00 1.12 0.95 0.15  
160860 0 2 0.00 1.12 0.95 0.15  
190860 0 2 0.00 1.12 0.95 0.15  
220860 0 2 0.00 1.12 0.95 0.15  
070861 0 2 0.00 1.12 0.95 0.15  
100861 0 2 0.00 1.12 0.95 0.15  
130861 0 2 0.00 1.12 0.95 0.15  
160861 0 2 0.00 1.12 0.95 0.15

190861 0 2 0.00 1.12 0.95 0.15  
220861 0 2 0.00 1.12 0.95 0.15  
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160862 0 2 0.00 1.12 0.95 0.15  
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220862 0 2 0.00 1.12 0.95 0.15  
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130863 0 2 0.00 1.12 0.95 0.15  
160863 0 2 0.00 1.12 0.95 0.15  
190863 0 2 0.00 1.12 0.95 0.15  
220863 0 2 0.00 1.12 0.95 0.15  
070864 0 2 0.00 1.12 0.95 0.15  
100864 0 2 0.00 1.12 0.95 0.15  
130864 0 2 0.00 1.12 0.95 0.15  
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190864 0 2 0.00 1.12 0.95 0.15  
220864 0 2 0.00 1.12 0.95 0.15  
070865 0 2 0.00 1.12 0.95 0.15  
100865 0 2 0.00 1.12 0.95 0.15  
130865 0 2 0.00 1.12 0.95 0.15  
160865 0 2 0.00 1.12 0.95 0.15  
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100867 0 2 0.00 1.12 0.95 0.15  
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220867 0 2 0.00 1.12 0.95 0.15  
070868 0 2 0.00 1.12 0.95 0.15  
100868 0 2 0.00 1.12 0.95 0.15  
130868 0 2 0.00 1.12 0.95 0.15  
160868 0 2 0.00 1.12 0.95 0.15  
190868 0 2 0.00 1.12 0.95 0.15  
220868 0 2 0.00 1.12 0.95 0.15  
070869 0 2 0.00 1.12 0.95 0.15

100869 0 2 0.00 1.12 0.95 0.15  
130869 0 2 0.00 1.12 0.95 0.15  
160869 0 2 0.00 1.12 0.95 0.15  
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220869 0 2 0.00 1.12 0.95 0.15  
070870 0 2 0.00 1.12 0.95 0.15  
100870 0 2 0.00 1.12 0.95 0.15  
130870 0 2 0.00 1.12 0.95 0.15  
160870 0 2 0.00 1.12 0.95 0.15  
190870 0 2 0.00 1.12 0.95 0.15  
220870 0 2 0.00 1.12 0.95 0.15  
070871 0 2 0.00 1.12 0.95 0.15  
100871 0 2 0.00 1.12 0.95 0.15  
130871 0 2 0.00 1.12 0.95 0.15  
160871 0 2 0.00 1.12 0.95 0.15  
190871 0 2 0.00 1.12 0.95 0.15  
220871 0 2 0.00 1.12 0.95 0.15  
070872 0 2 0.00 1.12 0.95 0.15  
100872 0 2 0.00 1.12 0.95 0.15  
130872 0 2 0.00 1.12 0.95 0.15  
160872 0 2 0.00 1.12 0.95 0.15  
190872 0 2 0.00 1.12 0.95 0.15  
220872 0 2 0.00 1.12 0.95 0.15  
070873 0 2 0.00 1.12 0.95 0.15  
100873 0 2 0.00 1.12 0.95 0.15  
130873 0 2 0.00 1.12 0.95 0.15  
160873 0 2 0.00 1.12 0.95 0.15  
190873 0 2 0.00 1.12 0.95 0.15  
220873 0 2 0.00 1.12 0.95 0.15  
070874 0 2 0.00 1.12 0.95 0.15  
100874 0 2 0.00 1.12 0.95 0.15  
130874 0 2 0.00 1.12 0.95 0.15  
160874 0 2 0.00 1.12 0.95 0.15  
190874 0 2 0.00 1.12 0.95 0.15  
220874 0 2 0.00 1.12 0.95 0.15  
070875 0 2 0.00 1.12 0.95 0.15  
100875 0 2 0.00 1.12 0.95 0.15  
130875 0 2 0.00 1.12 0.95 0.15  
160875 0 2 0.00 1.12 0.95 0.15  
190875 0 2 0.00 1.12 0.95 0.15  
220875 0 2 0.00 1.12 0.95 0.15  
070876 0 2 0.00 1.12 0.95 0.15  
100876 0 2 0.00 1.12 0.95 0.15  
130876 0 2 0.00 1.12 0.95 0.15  
160876 0 2 0.00 1.12 0.95 0.15

190876 0 2 0.00 1.12 0.95 0.15  
220876 0 2 0.00 1.12 0.95 0.15  
070877 0 2 0.00 1.12 0.95 0.15  
100877 0 2 0.00 1.12 0.95 0.15  
130877 0 2 0.00 1.12 0.95 0.15  
160877 0 2 0.00 1.12 0.95 0.15  
190877 0 2 0.00 1.12 0.95 0.15  
220877 0 2 0.00 1.12 0.95 0.15  
070878 0 2 0.00 1.12 0.95 0.15  
100878 0 2 0.00 1.12 0.95 0.15  
130878 0 2 0.00 1.12 0.95 0.15  
160878 0 2 0.00 1.12 0.95 0.15  
190878 0 2 0.00 1.12 0.95 0.15  
220878 0 2 0.00 1.12 0.95 0.15  
070879 0 2 0.00 1.12 0.95 0.15  
100879 0 2 0.00 1.12 0.95 0.15  
130879 0 2 0.00 1.12 0.95 0.15  
160879 0 2 0.00 1.12 0.95 0.15  
190879 0 2 0.00 1.12 0.95 0.15  
220879 0 2 0.00 1.12 0.95 0.15  
070880 0 2 0.00 1.12 0.95 0.15  
100880 0 2 0.00 1.12 0.95 0.15  
130880 0 2 0.00 1.12 0.95 0.15  
160880 0 2 0.00 1.12 0.95 0.15  
190880 0 2 0.00 1.12 0.95 0.15  
220880 0 2 0.00 1.12 0.95 0.15  
070881 0 2 0.00 1.12 0.95 0.15  
100881 0 2 0.00 1.12 0.95 0.15  
130881 0 2 0.00 1.12 0.95 0.15  
160881 0 2 0.00 1.12 0.95 0.15  
190881 0 2 0.00 1.12 0.95 0.15  
220881 0 2 0.00 1.12 0.95 0.15  
070882 0 2 0.00 1.12 0.95 0.15  
100882 0 2 0.00 1.12 0.95 0.15  
130882 0 2 0.00 1.12 0.95 0.15  
160882 0 2 0.00 1.12 0.95 0.15  
190882 0 2 0.00 1.12 0.95 0.15  
220882 0 2 0.00 1.12 0.95 0.15  
070883 0 2 0.00 1.12 0.95 0.15  
100883 0 2 0.00 1.12 0.95 0.15  
130883 0 2 0.00 1.12 0.95 0.15  
160883 0 2 0.00 1.12 0.95 0.15  
190883 0 2 0.00 1.12 0.95 0.15  
220883 0 2 0.00 1.12 0.95 0.15

2 1 0.0

0.000 0.077 0.5  
 Soil Series: Loring silt loam; Hydrologic Group C  
 155.00 0.00 0 0 0 0 0 0 0 0 0  
 4300.0 0.0012 0.00  
 6  
 1 13.00 1.400 0.385 0.000 0.000 0.000  
 .00901 .00901 0.000  
 0.100 0.385 0.151 2.180 132.3  
 2 23.00 1.400 0.370 0.000 0.000 0.000  
 .00901 .00901 0.000  
 1.000 0.370 0.146 0.490 29.74  
 3 33.00 1.400 0.370 0.000 0.000 0.000  
 .00901 .00901 0.000  
 1.000 0.370 0.146 0.160 9.128  
 4 30.00 1.450 0.340 0.000 0.000 0.000  
 .00901 .00901 0.000  
 1.000 0.340 0.125 0.124 7.527  
 5 23.00 1.490 0.335 0.000 0.000 0.000  
 0.0109 0.0109 0.000  
 1.000 0.335 0.137 0.070 4.249  
 6 33.00 1.510 0.343 0.000 0.000 0.000  
 0.0109 0.0109 0.000  
 1.000 0.343 0.147 0.060 3.642  
 0  
 YEAR 5      YEAR 5      YEAR 5 1  
 6  
 11 -----  
 5    YEAR  
 RFLX TSER      1.0E+05  
 EFLX TSER      1.0E+05  
 ESLS TSER      1.0E+00  
 RUNF TSER      1.0E+00  
 PRCP TSER      1.0E+00

Chlorpyrifos use on cotton - Jackson County, Mississippi

Major Land Resource Area 134: Southern Mississippi Valley Silty Uplands

Loring Silt Loam (Hydraulic Soil Group: C)

6 aerial applications at 1.0 lb a.i./ac

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

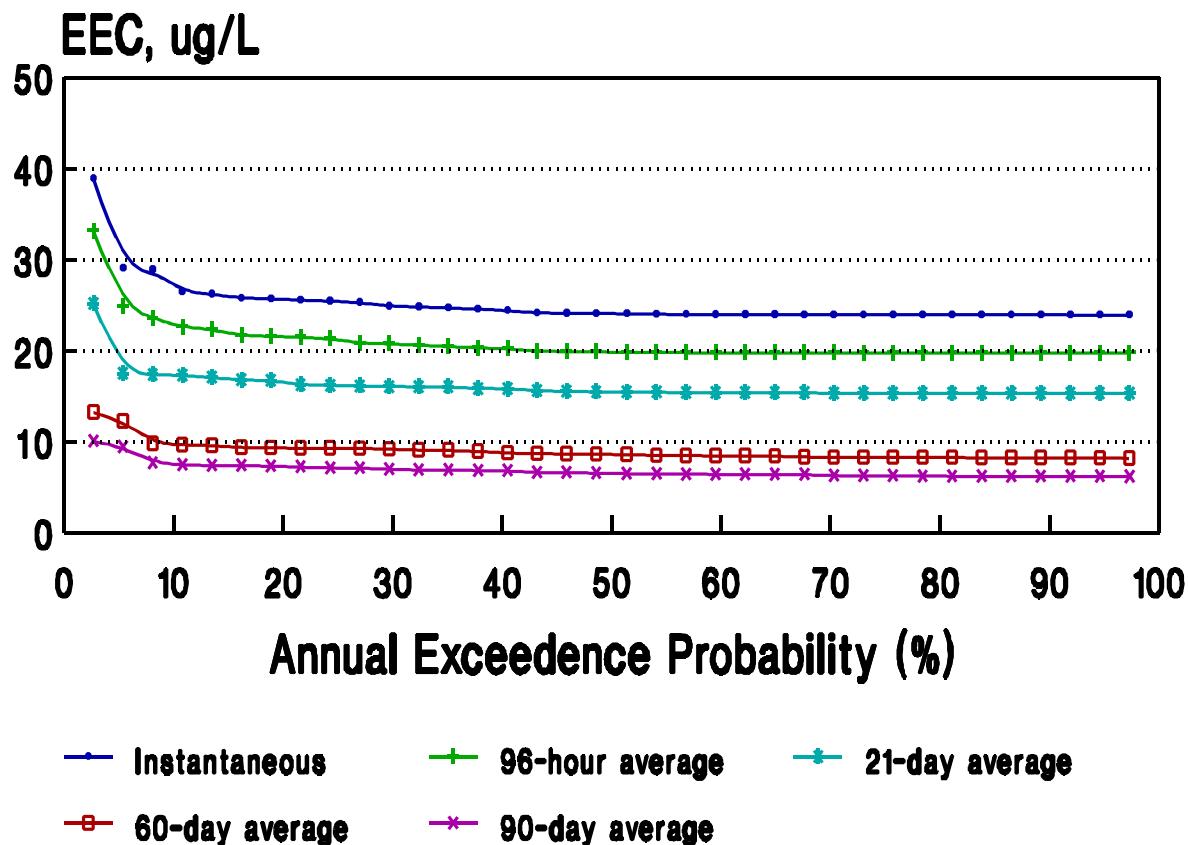
YEAR PEAK 96 HOUR 21 DAY 60 DAY 90 DAY YEARLY

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	24.730	20.640	16.210	8.681	6.615	2.249
1949	28.920	24.850	17.410	9.612	7.685	2.702
1950	24.590	21.670	16.770	9.667	7.349	2.775
1951	24.000	19.830	15.390	8.462	6.438	2.207
1952	23.960	19.780	15.350	8.294	6.227	2.065
1953	24.440	20.320	15.630	8.343	6.254	2.037
1954	23.950	19.770	15.340	8.226	6.213	2.044
1955	23.960	19.780	15.340	8.317	6.299	2.036
1956	23.950	19.770	15.340	8.283	6.242	2.043
1957	26.490	22.630	17.510	9.384	7.392	2.615
1958	25.470	21.490	16.280	9.209	6.987	2.489
1959	25.550	21.600	16.060	9.102	6.918	2.388
1960	25.790	21.350	16.060	9.338	7.257	2.505
1961	24.150	19.980	15.500	8.283	6.213	2.270
1962	23.970	19.790	15.540	8.504	6.427	2.223
1963	23.950	19.770	15.340	8.289	6.215	2.041
1964	25.320	20.230	15.860	9.086	6.913	2.335
1965	23.960	19.780	15.350	8.763	6.638	2.279
1966	38.950	33.170	25.180	13.260	10.060	3.383
1967	24.030	19.860	15.430	8.956	6.834	2.421
1968	23.970	19.790	15.360	8.458	6.401	2.067
1969	26.250	22.380	16.790	9.310	7.123	2.373
1970	24.100	19.870	15.420	8.263	6.393	2.311
1971	23.980	19.800	15.460	8.263	6.220	2.057
1972	25.730	20.490	15.850	9.343	7.404	2.727
1973	24.070	19.900	15.480	9.284	7.128	2.592
1974	23.980	19.800	15.420	8.706	6.578	2.252
1975	23.980	19.800	15.370	8.251	6.229	2.095
1976	23.960	19.780	15.390	8.487	6.483	2.134
1977	23.970	19.790	15.350	8.439	6.396	2.172
1978	24.130	19.780	17.300	12.260	9.470	3.155
1979	29.070	23.540	17.090	9.807	7.489	2.769
1980	23.960	19.780	15.340	8.275	6.257	2.140
1981	24.910	20.860	16.080	8.661	6.828	2.266
1982	24.830	20.760	16.140	8.603	6.470	2.359
1983	23.960	19.780	15.350	8.188	6.171	2.108

upper  
10th 27.219 22.903 17.333 9.709 7.548 2.771  
percentile

MEAN OF ANNUAL VALUES = 2.352  
STANDARD DEVIATION OF ANNUAL VALUES = .319  
UPPER 90% CONFIDENCE LIMIT ON MEAN = 2.431

**EEC Plot - Chlorprifos Use on Cotton  
Major Land Resource Area (MLRA): 134  
Southern Mississippi Valley Silty Upland**



**Loring Silt Loam (HSG: C)  
6 Aerial Applications @ 1.0 lb a.i./ac**

## **SITES/SCENARIOS FOR TOBACCO**

This report describes the Tier II estimated environmental concentration (EEC) computer modeling for chlorpyrifos use on tobacco. The purpose of this analysis is to generate an aquatic exposure estimates for use in a refined ecological risk assessment for this chemical. It assumes one application at the maximum permitted label rate of 5.0 pounds per hectare. This Tier II EEC calculation uses a single site which represents a high exposure scenario for the use of Chlorpyrifos. It employs the standard scenario which represents a 10 hectare field draining into a 1 hectare pond, 2 m deep with no outlet. Inflow to the pond from runoff is assumed to be equal in magnitude to loss from evaporation.

The weather and agricultural practice are simulated at the site over 36 years so that the ten year exceedence probability EEC at that site can be estimated. The EEC's generated in this analysis were calculated using PRZM2 for simulating runoff from the agricultural field and EXAMS 2.94 for estimating environmental fate and transport in surface water.

The site is a tobacco field in Wake county, North Carolina in MLRA 133A. The soil at the site is a Norfolk loamy sand. Soil parameters were taken from the PIC database and the 1987 National Resources Inventory. The Norfolk loamy sand is hydrologic group B soil and SCS curve numbers were generated based on this grouping and the plant cover (United States Soil Conservation Service, 1972). The weather data file is part of the PIRANHA shell and is used to represent the weather for MLRA 133A. This is weather station W13895 in Montgomery, AL.

The parameters used in PRZM2 to describe the scenario are tabulated in Table 1 attached. The chemical and environment parameters used in the EXAMS program are tabulated in Table 2 also attached to this report. The site was selected to represent tobacco site in the south-eastern United States that would be likely to present high exposure to aquatic organisms.

### **Procedure**

The PRZM simulation was run for a period of 36 years from 1948 to 1983 with application of the pesticide once per year at the label rate of 5.0 pounds per acre of active ingredient for each application. EXAMS loading (PRZM3.12EXA) files were developed to have 1% of each application rate applied to the pond as spray drift. EXAMS was run for all 36 years in mode 3. The yearly maxima, largest yearly peaks, maximum 96-hour means and largest yearly 21-day means were extracted from the REPORT.XMS file produced by EXAMS. The largest yearly 60- and 90-day means were calculated by PEO from daily concentration values generated by EXAMS. The 10-year return EEC's (or 10% yearly exceedence EEC's) show on the graphs and listed in the attached Tables were calculated by linear interpolation between the third and fourth largest values. Input files for these analyses are also attached to the end of this report.

### **Limitations of this Analysis**

There are several factors which could limit the accuracy and precision of this analysis including the selection of the high exposure scenarios, the quality of the input data, the ability of the models

to represent the real world, and the number of years that were modeled.

Scenarios that are selected for use in Tier 2 EEC calculations are ones that likely to produce relatively high concentrations in the aquatic environment. Each scenario should represent a real site to which the pesticide in question is likely to be applied. Sites should be extreme enough to provide conservative estimates of the EEC, but not so extreme that the model cannot properly simulate the fate and transport processes at the site. Currently, sites are chosen by best professional judgement to represent sites which generally produce EEC's larger than 90% of all sites use for that crop. The EEC's in this analysis are accurate only to the extent that the site represents this hypothetical high exposure site. Another potentially limiting part of the site selection is the use of the standard pond with no outlet. A single pond with Georgia characteristics may not be a good representation of all water bodies in the state of North Carolina. It does, however, give a conservative estimate of an estimated environmental concentration (EEC) in a water body that serves as a surrogate for all sensitive water bodies and provides a level playing field on which most pesticides can be judged on equal terms.

The models themselves represent a limitation on the analysis quality. While the models are some of the best environmental fate estimation tools available, they have significant limitations in their ability to represent some processes. The most substantial limitation in this analysis is the handling of spray drift, which is estimated as a straight 1% of the application rate reaching the pond for each application. A second major limitation of the models is the lack of validation at the field level for pesticide runoff. While several of the algorithms (volume of runoff water, eroded sediment mass, are well validated and well understood, no adequate validation has yet been made of PRZM2 for the amount of pesticide transported in runoff events for all combinations of sites and pesticide fate characteristics. Other limitations of the models include: inability to handle within site variation (spatial variability), lack of crop growth algorithms, and overly simple soil water transport algorithms (i.e., the "tipping bucket" method).

A final limitation is that only thirty-six years of weather data was available for the site. Consequently there is approximately 1 chance in 20 that the true 10% exceedence EEC's are larger than the maximum EEC in the calculated in the analysis.

#### Chlorpyrifos

Norfolk Loamy Sand; MLRA P-133A, Wake County, North Carolina, Tobacco

0.770	0.150	0	27.50	1	1			
4								
0.24	0.33	1.00	10.00			3	1.00	354.0
1								
1	0.20	45.00	80.00			3	86	78
1	3					82	0.00	100.00
0101	21	9	2209					
0.41	0.41	0.41						
0.17	0.17	0.17						
36								
110448	060748	160748		1				

110449	060749	160749	1
110450	060750	160750	1
110451	060751	160751	1
110452	060752	160752	1
110453	060753	160753	1
110454	060754	160754	1
110455	060755	160755	1
110456	060756	160756	1
110457	060757	160757	1
110458	060758	160758	1
110459	060759	160759	1
110460	060760	160760	1
110461	060761	160761	1
110462	060762	160762	1
110463	060763	160763	1
110464	060764	160764	1
110465	060765	160765	1
110466	060766	160766	1
110467	060767	160767	1
110468	060768	160768	1
110469	060769	160769	1
110470	060770	160770	1
110471	060771	160771	1
110472	060772	160772	1
110473	060773	160773	1
110474	060774	160774	1
110475	060775	160775	1
110476	060776	160776	1
110477	060777	160777	1
110478	060778	160778	1
110479	060779	160779	1
110480	060780	160780	1
110481	060781	160781	1
110482	060782	160782	1
110483	060783	160783	1

Application 1 broadcast @ 5.0 lb a.i/a, incorported to 2", 1% spray drift

36 1 0 0

Chlorpyrifos KOC=6070, AeSM T1/2= 76.933 days

010448	0	1	5.08	5.60	0.95	.014
010449	0	1	5.08	5.60	0.95	.014
010450	0	1	5.08	5.60	0.95	.014
010451	0	1	5.08	5.60	0.95	.014
010452	0	1	5.08	5.60	0.95	.014
010453	0	1	5.08	5.60	0.95	.014
010454	0	1	5.08	5.60	0.95	.014

010455 0 1 5.08 5.60 0.95 .014  
010456 0 1 5.08 5.60 0.95 .014  
010457 0 1 5.08 5.60 0.95 .014  
010458 0 1 5.08 5.60 0.95 .014  
010459 0 1 5.08 5.60 0.95 .014  
010460 0 1 5.08 5.60 0.95 .014  
010461 0 1 5.08 5.60 0.95 .014  
010462 0 1 5.08 5.60 0.95 .014  
010463 0 1 5.08 5.60 0.95 .014  
010464 0 1 5.08 5.60 0.95 .014  
010465 0 1 5.08 5.60 0.95 .014  
010466 0 1 5.08 5.60 0.95 .014  
010467 0 1 5.08 5.60 0.95 .014  
010468 0 1 5.08 5.60 0.95 .014  
010469 0 1 5.08 5.60 0.95 .014  
010470 0 1 5.08 5.60 0.95 .014  
010471 0 1 5.08 5.60 0.95 .014  
010472 0 1 5.08 5.60 0.95 .014  
010473 0 1 5.08 5.60 0.95 .014  
010474 0 1 5.08 5.60 0.95 .014  
010475 0 1 5.08 5.60 0.95 .014  
010476 0 1 5.08 5.60 0.95 .014  
010477 0 1 5.08 5.60 0.95 .014  
010478 0 1 5.08 5.60 0.95 .014  
010479 0 1 5.08 5.60 0.95 .014  
010480 0 1 5.08 5.60 0.95 .014  
010481 0 1 5.08 5.60 0.95 .014  
010482 0 1 5.08 5.60 0.95 .014  
010483 0 1 5.08 5.60 0.95 .014

1 3 0.0

Norfolk Loamy Sand; Hydrologic Group B;

150.00 0.0 0 0 0 0 0 0 0 0  
4300.0 0.0012 00.00

4

1 10.00 1.550 0.199 0.000 0.000  
9.01e-3 9.01e-3 0.000  
0.1 0.199 0.089 0.290 17.6  
2 35.00 1.550 0.199 0.000 0.000  
9.01e-3 9.01e-3 0.000  
5.0 0.199 0.089 0.290 17.6  
3 55.00 1.300 0.406 0.000 0.000  
0.0109 0.0109 0.000  
5.0 0.406 0.206 0.116 7.04  
4 50.00 1.100 0.396 0.000 0.000  
0.0109 0.0109 0.000

		5.0	0.396	0.246	0.058	3.52
0	0					
	YEAR	5		YEAR	5	
6				YEAR	5	1
11	-----					
5	DAY					
RFLX	TSER	0	0	1.E5		
EFLX	TSER	0	0	1.E5		
ESLS	TSER	0	0	1.E0		
RUNF	TSER	0	0	1.E0		
PRCP	TSER	0	0	1.E0		

Chlorpyrifos use on tobacco -Wake County, North Carolina  
Major Land Resource Area 133A: Southern Coastal Plain  
Norfolk Loamy Sand (Hydraulic Soil Group: C)  
1 ground application at 5.0 lb a.i./ac

## WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR PEAK 96 HOUR 21 DAY 60 DAY 90 DAY YEARLY

1948	4.114	3.216	1.525	.723	.549	.274
1949	8.216	6.504	3.769	2.122	1.808	.641
1950	3.909	3.090	1.509	.747	.570	.336
1951	3.916	3.066	1.592	.789	.692	.315
1952	6.467	5.083	2.795	1.458	1.133	.371
1953	6.777	5.472	3.452	2.727	2.076	.774
1954	3.932	3.082	1.496	.728	.542	.221
1955	20.410	16.050	8.440	4.478	3.478	1.085
1956	3.924	3.073	1.773	.849	.648	.338
1957	46.490	36.490	19.190	10.920	8.258	2.552
1958	3.968	3.117	1.780	1.278	.988	.387
1959	7.646	5.981	2.903	1.445	1.211	.403
1960	18.350	14.390	7.393	3.665	2.838	.897
1961	3.945	3.092	1.602	.784	.687	.331
1962	11.060	8.895	4.820	2.622	2.038	.681
1963	3.911	3.062	1.462	.811	.831	.348
1964	41.100	32.240	17.530	9.233	6.932	2.221
1965	3.953	3.103	1.497	.721	.538	.254
1966	3.903	3.126	1.561	.739	.578	.236
1967	5.776	4.560	2.344	1.513	1.206	.434
1968	5.748	4.526	2.624	1.288	.971	.315
1969	3.901	3.052	1.451	.867	.672	.259
1970	4.031	3.432	1.687	1.068	1.000	.419
1971	3.910	3.118	1.493	1.110	.850	.330
1972	3.904	3.055	1.455	.708	.624	.317
1973	8.892	7.146	4.356	3.062	2.360	.809
1974	11.000	8.704	4.291	2.061	1.530	.545
1975	16.040	12.560	8.819	5.050	3.864	1.215
1976	6.547	5.158	2.660	1.493	1.241	.434
1977	3.987	3.121	1.487	.717	.544	.255
1978	15.730	12.490	7.259	4.245	3.414	1.139
1979	28.280	22.170	11.220	6.859	5.361	1.666
1980	4.415	3.515	2.460	1.685	1.350	.456
1981	28.990	22.690	10.800	5.177	3.995	1.229
1982	9.638	7.734	4.810	3.547	2.709	.900
1983	34.330	26.910	13.740	6.847	5.221	1.695

upper

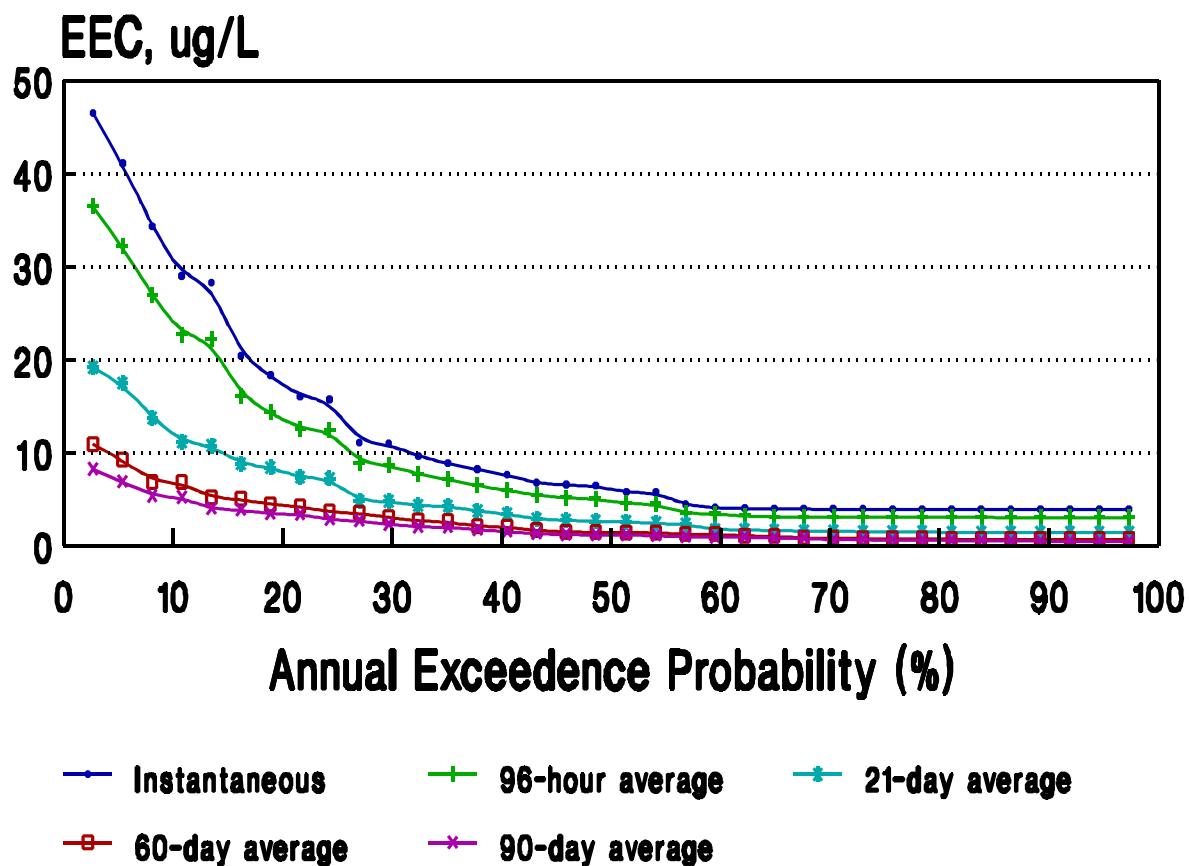
10th 30.592 23.956 11.976 6.851 5.263 1.675  
percentile

MEAN OF ANNUAL VALUES = 0.697

STANDARD DEVIATION OF ANNUAL VALUES = 0.575

UPPER 90% CONFIDENCE LIMIT ON MEAN = 0.839

**EEC Plot - Chlorprifos Use on Tobacco  
Major Land Resource Area (MLRA): 133A  
Southern Coastal Plain**



**Norfolk Loamy Sand (HSG: C)  
1 Ground Application @ 5.0 lb a.i./ac**

## SITES/SCENARIOS FOR CITRUS

This report describes the Tier II estimated environmental concentration (EEC) computer modeling for chlorpyrifos use on citrus trees. The purpose of this analysis is to generate aquatic exposure estimates for use in a refined ecological risk assessment for this chemical. This Tier II EEC calculation uses a single citrus site which represents a high exposure scenario for the use of chlorpyrifos on citrus trees. It uses the standard scenario which represents a 10 hectare field draining into a 1 hectare pond, 2 meters deep with no outlet. Evaporation from the pond is considered to be equal in magnitude to inflow into the pond from surface runoff. The site is located in central Florida and would be expected to produce moderate runoff due to relatively high rainfall but sandy soil. Soil erosion is expected to be low due also to the very sandy nature of the area. Air blast spray application is simulated.

The weather and agricultural practices are modelled at the site over 36 years so that the ten year exceedence probability EEC at that site can be estimated. The Tier 2 upper tenth percentile EEC's are graphed and listed below. The EEC's have been calculated so that in any given year, there is a 10% probability that the maximum of the average concentrations for each duration in that year will equal or exceed the EEC at the site. Durations for which average concentrations are calculated are those which correspond to the length of relevant toxicity tests.

The EEC's generated in this analysis were calculated using PRZM3.12 for simulating runoff from the agricultural field and EXAMS 2.97.5 for estimating environmental fate and transport in surface water. The parameters used in PRZM2 to describe the scenario are tabulated in Table 1 attached. The chemical and environment parameters used in the EXAMS program are tabulated in Table 2 also attached to this report. Copies of the PRZM3.12 input files are also attached.

The site is an orange grove in Osceola County, Florida in MLRA 156A. The soil at the site is an Adamsville Sand. Soil parameters were taken from the PIC database and the 1987 National Resources Inventory. The Adamsville sand is hydrologic group C soil and SCS curve numbers were generated based on this grouping and the plant cover (United States Soil Conservation Service, 1972). The weather data file is part of the PIRANHA shell and is used to represent the weather for MLRA 156A. This site receives about 93 cm of precipitation yearly. An average of 19% of this leaves the site as surface runoff.

### Procedure

The PRZM simulation was run for a period of 36 years from 1948 to 1983 with application of the pesticide two times per year. EXAMS loading (PRZM3.122EXA) files were developed to have 5% of each application rate applied to the pond as spray drift. EXAMS was run for all 36 years in mode 3. The yearly maximums, largest yearly peaks, maximum 96-hour means and largest yearly 21-day means were extracted from the REPORT.XMS file produced by EXAMS. The largest yearly 60- and 90-day means were calculated by the PEO program from daily concentration values generated by EXAMS. The 10 year return EEC's (or 10% yearly exceedence EEC's) are shown on attached graphs and are listed in attached tables. They were calculated by linear interpolation between the third and fourth largest values.

## **Limitations of this Analysis**

There are several factors which may limit the accuracy and precision of this analysis including the selection of the high exposure scenarios, the quality of the input data, the ability of the models to represent the real world, and the number of years that were modeled.

Scenarios that are selected for use in Tier 2 EEC calculations are ones that likely to produce large concentrations in the aquatic environment. Each scenario should represent a real site to which the pesticide in question is likely to be applied. Sites should be extreme enough to provide conservative estimates of the EEC, but not so extreme that the model cannot properly simulate the fate and transport processes at the site. Currently, sites are chosen by best professional judgement to represent sites which generally produce EEC's larger than 90% of all sites use for that crop. The EEC's in this analysis are accurate to the extent that the site represents this hypothetical high exposure site. Another limiting part of the site selection is the use of the standard pond. Obviously, a Georgia pond, even with appropriately modified temperature data may not be the most appropriate water body for use in Florida. It does however provide a level playing field on which most pesticides can be judged on equal terms.

The models themselves may also represent a limitation on the accuracy of the analysis. While the models are some of the best environmental fate estimation tools available, they have significant limitations in their ability to represent some processes. The most substantial limitation in this analysis is the handling of spray drift, which is estimated as a straight 5% of the application rate reaching the pond for each application. A second major limitation of the models is the lack of validation at the field level for pesticide runoff. While several of the algorithms (volume of runoff water, eroded sediment mass, are well validated and well understood, no adequate validation has yet been made of PRZM3.12 for the amount of pesticide transported in runoff events for all combinations of sites and pesticide fate characteristics. Other limitations of the models include: inability to handle within site variation (spatial variability), lack of crop growth algorithms, and overly simple soil water transport algorithms (i.e., the "tipping bucket" method).

A final limitation is that only thirty-six years of weather data was available for the site. Consequently there is approximately 1 chance in 20 that the true 10% exceedence EEC's are larger than the maximum EEC in the calculated in the analysis.

PRZM3 Input File, flcit.inp (Jan 28 2000)

Location: Osceola County, FL.; Crop: citrus; MLRA 156A

```
0.77 0.15 0 25.00 1 1
4
0.10 0.13 1.00 10.0      3 1.00 354.0
1
1 0.10 100.00 80.00    3 94 84 89  0.00 100.00
1 3
0101 21 9 2209
0.10 0.10 0.10
.023 .023 .023
```

36

110548	170748	10848	1
110549	170749	10849	1
110550	170750	10850	1
110551	170751	10851	1
110552	170752	10852	1
110553	170753	10853	1
110554	170754	10854	1
110555	170755	10855	1
110556	170756	10856	1
110557	170757	10857	1
110558	170758	10858	1
110559	170759	10859	1
110560	170760	10860	1
110561	170761	10861	1
110562	170762	10862	1
110563	170763	10863	1
110564	170764	10864	1
110565	170765	10865	1
110566	170766	10866	1
110567	170767	10867	1
110568	170768	10868	1
110569	170769	10869	1
110570	170770	10870	1
110571	170771	10871	1
110572	170772	10872	1
110573	170773	10873	1
110574	170774	10874	1
110575	170775	10875	1
110576	170776	10876	1
110577	170777	10877	1
110578	170778	10878	1
110579	170779	10879	1
110580	170780	10880	1
110581	170781	10881	1
110582	170782	10882	1
110583	170783	10883	1

Application: 72 aerial appl. 3.5 lb a.i./ac @95% eff, w/15%drift

72 1 0 0

chlorpyrifos

010748	0 2 0.00	3.92	0.95	0.15
010848	0 2 0.00	3.92	0.95	0.15
010749	0 2 0.00	3.92	0.95	0.15
010849	0 2 0.00	3.92	0.95	0.15
010750	0 2 0.00	3.92	0.95	0.15
010850	0 2 0.00	3.92	0.95	0.15
010751	0 2 0.00	3.92	0.95	0.15

010851 0 2 0.00 3.92 0.95 0.15  
010752 0 2 0.00 3.92 0.95 0.15  
010852 0 2 0.00 3.92 0.95 0.15  
010753 0 2 0.00 3.92 0.95 0.15  
010853 0 2 0.00 3.92 0.95 0.15  
010754 0 2 0.00 3.92 0.95 0.15  
010854 0 2 0.00 3.92 0.95 0.15  
010755 0 2 0.00 3.92 0.95 0.15  
010855 0 2 0.00 3.92 0.95 0.15  
010756 0 2 0.00 3.92 0.95 0.15  
010856 0 2 0.00 3.92 0.95 0.15  
010757 0 2 0.00 3.92 0.95 0.15  
010857 0 2 0.00 3.92 0.95 0.15  
010758 0 2 0.00 3.92 0.95 0.15  
010858 0 2 0.00 3.92 0.95 0.15  
010759 0 2 0.00 3.92 0.95 0.15  
010859 0 2 0.00 3.92 0.95 0.15  
010760 0 2 0.00 3.92 0.95 0.15  
010860 0 2 0.00 3.92 0.95 0.15  
010761 0 2 0.00 3.92 0.95 0.15  
010861 0 2 0.00 3.92 0.95 0.15  
010762 0 2 0.00 3.92 0.95 0.15  
010862 0 2 0.00 3.92 0.95 0.15  
010763 0 2 0.00 3.92 0.95 0.15  
010863 0 2 0.00 3.92 0.95 0.15  
010764 0 2 0.00 3.92 0.95 0.15  
010864 0 2 0.00 3.92 0.95 0.15  
010765 0 2 0.00 3.92 0.95 0.15  
010865 0 2 0.00 3.92 0.95 0.15  
010766 0 2 0.00 3.92 0.95 0.15  
010866 0 2 0.00 3.92 0.95 0.15  
010767 0 2 0.00 3.92 0.95 0.15  
010867 0 2 0.00 3.92 0.95 0.15  
010768 0 2 0.00 3.92 0.95 0.15  
010868 0 2 0.00 3.92 0.95 0.15  
010769 0 2 0.00 3.92 0.95 0.15  
010869 0 2 0.00 3.92 0.95 0.15  
010770 0 2 0.00 3.92 0.95 0.15  
010870 0 2 0.00 3.92 0.95 0.15  
010771 0 2 0.00 3.92 0.95 0.15  
010871 0 2 0.00 3.92 0.95 0.15  
010772 0 2 0.00 3.92 0.95 0.15  
010872 0 2 0.00 3.92 0.95 0.15  
010773 0 2 0.00 3.92 0.95 0.15  
010873 0 2 0.00 3.92 0.95 0.15  
010774 0 2 0.00 3.92 0.95 0.15  
010874 0 2 0.00 3.92 0.95 0.15

010775 0 2 0.00 3.92 0.95 0.15  
010875 0 2 0.00 3.92 0.95 0.15  
010776 0 2 0.00 3.92 0.95 0.15  
010876 0 2 0.00 3.92 0.95 0.15  
010777 0 2 0.00 3.92 0.95 0.15  
010877 0 2 0.00 3.92 0.95 0.15  
010778 0 2 0.00 3.92 0.95 0.15  
010878 0 2 0.00 3.92 0.95 0.15  
010779 0 2 0.00 3.92 0.95 0.15  
010879 0 2 0.00 3.92 0.95 0.15  
010780 0 2 0.00 3.92 0.95 0.15  
010880 0 2 0.00 3.92 0.95 0.15  
010781 0 2 0.00 3.92 0.95 0.15  
010881 0 2 0.00 3.92 0.95 0.15  
010782 0 2 0.00 3.92 0.95 0.15  
010882 0 2 0.00 3.92 0.95 0.15  
010783 0 2 0.00 3.92 0.95 0.15  
010883 0 2 0.00 3.92 0.95 0.15

0. 1

0.00 0.289 0.50

Soil Series: Adamsville sand; Hydrologic Group C

100.00 0 0 0 0 0 0 0 0 0

4300.0 0.0012 00.00

3

1 10.000 1.440 0.086 0.000 0.000 0.000  
.00901 .00901 0.000  
0.100 0.086 0.036 0.580 35.2  
2 10.000 1.440 0.086 0.000 0.000 0.000  
.00901 .00901 0.000  
1.000 0.086 0.036 0.580 35.2  
3 80.000 1.580 0.030 0.000 0.000 0.000  
.0109 .0109 0.000  
5.000 0.030 0.023 0.116 7.04

0

WATR YEAR 10 PEST YEAR 10 CONC YEAR 10 1

6

11 -----

5 DAY

RFLX TSER 0 0 1.E5  
EFLX TSER 0 0 1.E5  
ESLS TSER 0 0 1.E0  
RUNF TSER 0 0 1.E0  
PRCP TSER 0 0 1.E0

Chlorpyrifos use on citrus - Osceola County, Florida

Major Land Resource Area 156: Florida Everglades and Associated Area

Adamsville Sand (Hydrologic Soil Group: C)

2 aerial applications at 3.50 lb a.i./ac

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	35.310	27.850	13.980	10.790	10.180	4.231
1949	31.400	24.800	12.430	9.616	7.952	3.098
1950	31.970	25.530	15.510	11.570	9.390	3.606
1951	32.180	27.260	14.410	11.120	8.641	3.156
1952	42.350	33.120	17.780	13.260	10.370	4.071
1953	31.890	25.190	16.240	10.950	9.370	3.513
1954	32.170	25.470	12.870	10.200	8.414	2.933
1955	32.620	25.760	13.020	9.615	7.888	2.772
1956	31.330	24.720	12.690	9.425	8.100	2.833
1957	37.680	31.470	19.710	15.140	12.630	4.543
1958	31.870	26.210	14.970	11.140	9.151	3.372
1959	32.010	26.460	15.720	11.280	9.695	3.741
1960	32.120	25.350	13.490	10.720	9.902	3.785
1961	31.370	24.760	13.020	9.607	7.587	2.621
1962	31.450	24.830	15.420	10.640	8.615	3.041
1963	31.320	24.720	12.620	9.409	7.897	2.785
1964	31.680	25.010	12.860	10.590	9.823	3.560
1965	35.040	29.700	15.530	10.380	8.991	3.519
1966	32.620	27.510	16.690	11.220	8.974	3.552
1967	32.280	26.420	17.540	12.280	9.801	3.956
1968	36.050	30.720	20.120	12.680	10.210	3.901
1969	37.200	28.980	16.090	11.910	9.451	3.422
1970	31.580	24.930	12.560	9.336	7.825	2.781
1971	31.480	24.880	14.260	10.080	8.572	3.122
1972	32.110	25.370	12.790	9.821	8.072	2.687
1973	31.590	24.960	15.040	11.180	9.952	3.637
1974	32.540	26.270	16.650	11.330	9.113	3.302
1975	34.910	27.560	14.750	10.680	8.361	2.880
1976	31.500	24.880	14.360	10.800	8.900	3.092
1977	31.630	24.990	13.980	10.130	8.590	3.091
1978	31.330	25.590	12.880	9.353	7.278	2.571
1979	31.750	26.540	14.700	10.250	8.261	2.961
1980	38.560	31.870	18.580	13.030	10.980	4.143
1981	36.340	30.140	19.190	12.780	11.210	4.242
1982	31.470	24.900	13.390	9.633	7.610	2.923
1983	35.040	27.640	13.950	9.930	7.893	2.728

upper

10th 37.344 30.945 18.763 12.855 10.553 4.169

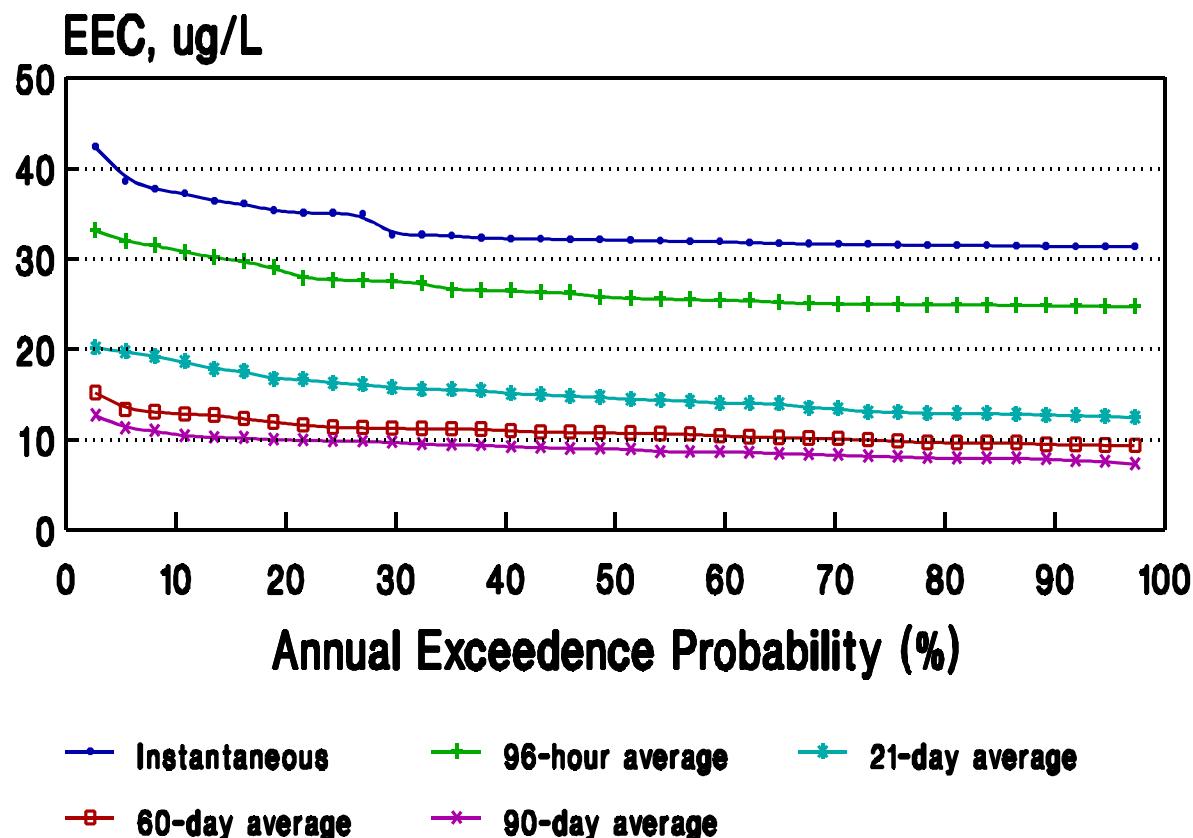
percentile

MEAN OF ANNUAL VALUES = 3.338

STANDARD DEVIATION OF ANNUAL VALUES = 0.528

UPPER 90% CONFIDENCE LIMIT ON MEAN = 3.468

**EEC Plot - Chlorprifos Use on Citrus  
Major Land Resource Area (MLRA): 156A  
Florida Everglades and Associated Area**



**Adamsville Sand (HSG: C)  
2 Aerial Applications @ 3.5 lb a.i./ac**

GENEEC Model (Examples)

No. 1. CHLORPYRIFOS (1 Aerial Broadcast Spray Application)

RATE (#/AC ONE(MULT))	APPLICATIONS NO.-INTERVAL	SOIL KOC	SOLUBILITY (PPM)	% SPRAY DRIFT	INCORP. DEPTH (IN)
2.000( 2.000)	1	1	6070.0	2.0	5.0 0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
180.00	2	N/A	29.60-	3631.92	.00 3631.92

GENERIC EECs (IN PPB)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
10.30	9.19	5.19	3.23

No. 2. CHLORPYRIFOS (1 Ground Broadcast Spray Application)

RATE (#/AC ONE(MULT))	APPLICATIONS NO.-INTERVAL	SOIL KOC	SOLUBILITY (PPM)	% SPRAY DRIFT	INCORP. DEPTH (IN)
2.000( 2.000)	1	1	6070.0	2.0	1.0 0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
180.00	2	N/A	29.60-	3631.92	.00 3631.92

GENERIC EECs (IN PPB)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
7.37	6.46	3.72	2.40

No. 3. CHLORPYRIFOS (1 Ground Soil Incorporated Spray Application)

RATE (#/AC ONE(MULT))	APPLICATIONS NO.-INTERVAL	SOIL KOC	SOLUBILITY (PPM)	% SPRAY DRIFT	INCORP. DEPTH (IN)
2.000( 2.000)	1	1	6070.0	2.0	1.0 1.5

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
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180.00	2	N/A	29.60-	3631.92	.00	3631.92
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GENERIC EECs (IN PPB)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
--------------	-----------------------	------------------------	------------------------

5.18	4.55	2.62	1.67
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No. 4. CHLORPYRIFOS (3 Aerial Broadcast Spray Applications)

RATE (#/AC) ONE(MULT)	APPLICATIONS NO.-INTERVAL	SOIL KOC	SOLUBILITY (PPM)	% SPRAY DRIFT	INCORP. DEPTH (IN)
--------------------------	------------------------------	-------------	---------------------	------------------	-----------------------

2.000( 5.842)	3	7	6070.0	2.0	5.0	0
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FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
----------------------	---------------------------	----------------------	--------------------------	---------------------	--------------------

180.00	0	N/A	29.60-	3631.92	.00	3631.92
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GENERIC EECs (IN PPB)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
--------------	-----------------------	------------------------	------------------------

33.48	29.93	16.61	10.10
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No. 5. CHLORPYRIFOS (3 Ground Broadcast Spray Applications)

RATE (#/AC) ONE(MULT)	APPLICATIONS NO.-INTERVAL	SOIL KOC	SOLUBILITY (PPM)	% SPRAY DRIFT	INCORP. DEPTH (IN)
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2.000( 5.842)	3	7	6070.0	2.0	1.0	0
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FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
----------------------	---------------------------	----------------------	--------------------------	---------------------	--------------------

180.00	0	N/A	29.60-	3631.92	.00	3631.92
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GENERIC EECs (IN PPB)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
--------------	-----------------------	------------------------	------------------------

22.34	19.60	11.22	7.17
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